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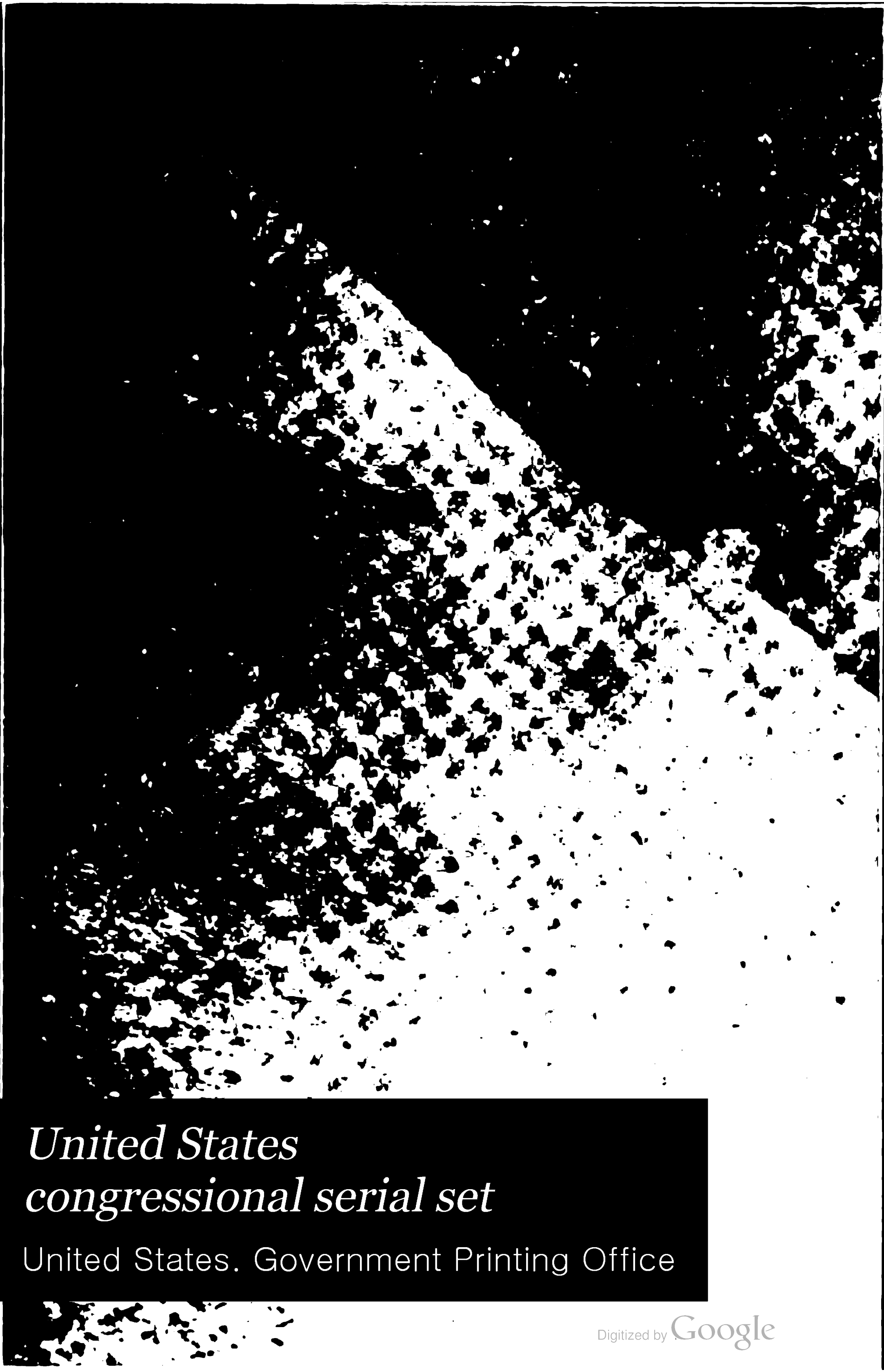

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ANNUAL REPORTS, WAR DEPARTMENT
FISCAL YEAR ENDED JUNE 30, 1910

REPORT OF THE
CHIEF OF ENGINEERS
U. S. ARMY

1910

IN THREE PARTS

PART II

WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

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APPENDIXES

TO THE

REPORT OF THE CHIEF OF ENGINEERS,

UNITED STATES ARMY

(CONTINUED).

APPENDIX L.

IMPROVEMENT OF RIVERS AND HARBORS IN THE NORFOLK, VIRGINIA, DISTRICT.

REPORT OF LIEUT. COL. MASON M. PATRICK, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Harbor at Norfolk, Virginia.
2. Harbor at Norfolk and the approaches thereto and the channel to Newport News.
3. Western Branch of Elizabeth River, Virginia.
4. Hampton Roads, Virginia.
5. Nansemond River, Virginia.
6. Pagan River, Virginia.
7. Appomattox River, Virginia.
8. Harbor at Cape Charles City, Virginia.
9. Onancock River, Virginia.
10. Waterway from Norfolk, Virginia, to the Sounds of North Carolina.
11. Inland water route from Norfolk Harbor, Virginia, to Albemarle Sound, North Carolina.
12. Perquimans River, North Carolina.
13. Blackwater River, Virginia.
14. Meherrin River, North Carolina.
15. Roanoke River, North Carolina.
16. Removing sunken vessels or craft obstructing or endangering navigation.

ENGINEER OFFICE, UNITED STATES ARMY,
Norfolk, Va., July 20, 1910.

SIR: I have the honor to transmit herewith my annual report upon the works of river and harbor improvement in my charge during the fiscal year ended June 30, 1910.

Very respectfully, your obedient servant,

MASON M. PATRICK,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

L 1.

IMPROVEMENT OF HARBOR AT NORFOLK, VIRGINIA.

(A) GENERAL IMPROVEMENT.

During the fiscal year ending June 30, 1910, no actual operations were carried on. The expenditures were for office expenses.

(B) HOSPITAL POINT.

No operations were carried on during the fiscal year and no expenditures were made..

(C) THIRTY-FOOT CHANNEL.

During the fiscal year, under a continuing contract, from one to three dredging plants were engaged in dredging between deep water in Hampton Roads and a point near the junction of the eastern and southern branches of the Elizabeth River, a distance of about 9 miles, and 2,762,982 cubic yards, scow measurement, of material, consisting mainly of soft and stiff mud, were removed. The contract price for the work was 7.3 cents per cubic yard, scow measurement, and the material was dumped near Willoughby bank, requiring an average tow of about 10 miles. The cost of the dredging and contingent expenses during the fiscal year was $211,418.37.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $100,000.00
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Improving harbor at Norfolk, Va.:	
August 14, 1876	$35,000.00
June 18, 1878	50,000.00
March 3, 1879	75,000.00
June 14, 1880	50,000.00
March 3, 1881	75,000.00
August 2, 1882	75,000.00
July 5, 1884	75,000.00
August 5, 1886	187,500.00
August 11, 1888	60,000.00
September 19, 1890	150,000.00
July 13, 1892	150,000.00
August 18, 1894	100,000.00
June 3, 1896	100,000.00
June 13, 1902	30,000.00
March 3, 1903	183,957.00
March 3, 1905	40,000.00
March 2, 1907	319,825.00
May 27, 1908	125,000.00
March 4, 1909	200,000.00
June 25, 1910	145,000.00
Allotment of November 23, 1904, from act of April 28, 1904, for "Emergencies in river and harbor works"	30,000.00
Improving Elizabeth River, Virginia:	
July 7, 1898	360,000.00
Total	2,616,282.00
Received from sales	79.36
Total	2,616,361.36
Amount turned into surplus fund of the Treasury from appropriation of July 7, 1898	483.58
Aggregate	2,615,877.78

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACT IN FORCE.

THIRTY-FOOT CHANNEL.

With Coastwise Dredging Company, for dredging, dated August 6, 1907; approved August 22, 1907; date for commencing work, October 22, 1907; date for completing work, February 26, 1912. Price, 7.3 cents per cubic yard, scow measurement.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	[a] 1,250	[a] 910	[a] 2,160	[a] 4,444,286	([b])
Sailing	[a] 17	[a] 9	[a] 26	[a] 13,874	([b])

[a] Only clearances through the custom-house at Norfolk, Va.

[b] Not known.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Blocks, paving	16,500,000	16,500	$270,000
Brick	3,200,000	8,000	16,000
Broken stone	In bulk	5,000	7,500
Chemicals	do	90,679	1,339,633
Clay	do	28,000	28,000
Coal	do	3,886,956	10,186,334
Coke	do	87,028	261,084
Corn	340,964 bushels	9,547	200,487
Cotton	638,379 bales	56,250	14,062,500
Excelsior	2,400 bales	240	2,400
Fertilizer	In bulk and bags	138,363	2,937,675
Gasoline	31,393 barrels	4,679	109,930
Gravel	2,976 cubic yards	5,000	7,500
Lime	44,780 barrels	4,478	31,100
Logs	1,793,000	337,089	1,952,406
Lumber, creosote	2,150,000 feet	5,375	53,000
Lumber	341,048,000 feet	852,620	9,833,663
Oil, creosote	In bulk	7,000	105,000
Oil, mineral	33,010 barrels	5,504	73,582
Oysters	475,480 bushels	23,774	349,580
Pig iron	615,880 bars	30,794	562,960
Piling	504,000 linear feet	26,800	67,000
Plaster, land	In bulk and bags	28,750	111,000
Salt	40,650 bags	4,065	32,520
Sand	In bulk	60,000	25,000
Steel rail	97,700 rails	39,568	1,139,204
Ties	315,000	31,500	146,120
Wood	7,806 cords	11,709	46,902
Miscellaneous [a]		5,167,731	
Total		10,972,999	

[a] Includes agricultural products, machinery, dry goods, groceries, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Average haul or distance freight was carried, not known.
Rate per ton-mile, not known.

Approximate amount of freight handled by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1888	1,914,506	1899	6,260,284
1889	2,243,087	1900	5,538,051
1890	2,384,841	1901	7,761,356
1891	2,931,751	1902	7,853,108
1892	3,427,189	1903	9,478,900
1893	3,584,727	1904	10,780,972
1894	4,545,049	1905	10,914,378
1895	5,013,185	1906	15,662,080
1896	5,986,636	1907	13,643,849
1897	9,430,526	1908	11,746,746
1898	6.510,201	1909	10,972,999

L 2.

IMPROVEMENT OF HARBOR AT NORFOLK AND THE APPROACHES THERETO AND THE CHANNEL TO NEWPORT NEWS.

(A) HARBOR AT NORFOLK AND THE APPROACHES THERETO.

This is a new work which was authorized by the act of June 25, 1910. No work was done or expenditures made during the fiscal year ended June 30, 1910.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $175,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

June 25, 1910 (allotment)	$150,000

COMMERCIAL STATISTICS.

See current annual report upon "Improvement of Harbor at Norfolk, Virginia" (L 1).

APPROXIMATE AMOUNT OF FREIGHT HANDLED BY WATER DURING VARIOUS YEARS.

See current annual report upon "Improvement of Harbor at Norfolk, Virginia" (L 1).

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[a] Exclusive of the balance unexpended July 1, 1910.

(B) THIMBLE SHOAL.

This is a new work which was authorized by the act of June 25, 1910. No work was done or expenditures made during the fiscal year ended June 30, 1910.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $100,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

June 25, 1910 (allotment)	$235,000

COMMERCIAL STATISTICS.

See current annual report upon "Improvement of Harbor at Norfolk, Virginia" (L 1), and "Improvement of Hampton Roads, Virginia" (L 4).

APPROXIMATE AMOUNT OF FREIGHT HANDLED BY WATER DURING VARIOUS YEARS.

See current annual report upon "Improvement of Harbor at Norfolk, Virginia" (L 1), and "Improvement of Hampton Roads, Virginia" (L 4).

(C) SOUTH BRANCH OF ELIZABETH RIVER.

This is a new work which was authorized by the act of June 25, 1910. No work was done or expenditures made during the fiscal year ended June 30, 1910.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $50,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

June 25, 1910 (allotment)	$100,000

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Blocks, paving	16,500,000	16,500	$270,000
Chemicals	In bulk	42,861	322,633
Fertilizer	In bulk and bags	39,850	272,000
Lime	13,000 barrels	1,800	6,500
Logs	895,202	168,298	649,381
Lumber, creosote	2,150,000 feet	5,375	53,000
Lumber	106,273,200 feet	265,683	2,760,548
Oil, creosote	In bulk	7,000	105,000
Pig iron	352,800 bars	17,640	299,880
Piling	504,000 linear feet	26,800	67,000
Plaster, land	In bulk and bags	6,750	27,000
Steel rail	23,625 rails	9,568	239,204
Ties	315.000	31,500	146,120
Wood	7,806 cords	11,709	46,902
Miscellaneous[a]	Not known	5,000	200,000
Total		655,834	5,465,168

[a] Includes farm products, machinery, dry goods, groceries, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Average haul or distance freight was carried, not known.
Rate per ton-mile, not known.

Approximate amount of freight handled by water during various years.

	Short tons.
1908	646,253
1909	655,834

(D) THE CHANNEL TO NEWPORT NEWS.

This is a new work, which was authorized by the act of June 25, 1910. No work was done or expenditures made during the fiscal year ended June 30, 1910.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement [a] $100,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.

CONSOLIDATED.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement [a] $425,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

June 25, 1910 (allotment) $115,000

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

See current annual report upon "Improvement of Hampton Roads, Virginia" (L 4).

APPROXIMATE AMOUNT OF FREIGHT HANDLED BY WATER DURING VARIOUS YEARS.

See current annual report upon "Improvement of Hampton Roads, Virginia" (L 4).

CONSOLIDATED APPROPRIATIONS.

June 25, 1910	$600,000

L 3.

IMPROVEMENT OF WESTERN BRANCH OF ELIZABETH RIVER, VIRGINIA.

During the fiscal year, under an emergency contract and a contract supplementary thereto, 39,900 cubic yards, scow measurement, of soft mud with some sand, were removed in redredging the channel to its projected dimensions for a distance of about one-half a mile on its northerly side. The dredged material was dumped near Willoughby bank, about 12 miles distant from the mouth of this river, and the contract price for dredging and towing was 10.3 cents per cubic yard, scow measurement.

The total cost of the dredging, including contingent expenses, was $5,000.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

June 3, 1896	$45,000.00
Preservation and maintenance of river and harbor works, act of March 3, 1909 (allotment of Apr. 9, 1909)	5,000.00
Total	50,000.00
Amount turned into surplus fund of the Treasury from the act of June 3, 1896	328.35
Aggregate	49,671.65

CONTRACTS IN FORCE.

Emergency: With Norfolk Dredging Company, for dredging, dated September 10, 1909; date for commencing work, October 1, 1909; date for completing work, December 10, 1909. Price, 10.3 cents per cubic yard, scow measurement.

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[a] Exclusive of the balance unexpended July 1, 1910.

Supplemental: With Norfolk Dredging Company, providing for increasing the quantity of material to be removed and deposited in accordance with conditions of the emergency contract, dated September 10, 1909, for dredging Western Branch of Elizabeth River, Virginia, dated September 16, 1909; approved by the Chief of Engineers, U. S. Army, September 21, 1909; and by the Acting Secretary of War, September 22, 1909.

COMMERCIAL STATISTICS.

Vessel classification, not known.

Freight traffic.

Articles.	Amount in customary unit.	Amount in short tons.	Valuation.
Limestone	In bulk	10,550	$13,190
Ore	do	70,561	729,665
Empty truck packages	250,000 barrels	12,500	
Miscellaneous[a]		1,767,791	
Total		1,861,402	

[a] Includes forest products, farm products, machinery, dry goods, groceries, fertilizer, structural iron and steel, and other various articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1896	211,653	1903	1,225,709
1897	244,803	1904	1,173,439
1898	346,835	1905	1,323,657
1899	576,898	1906	4,189,795
1900	(a)	1907	2,487,113
1901	1,383,105	1908	1,830,617
1902	1,058,488	1909	1,861,402

[a] Not compiled.

L 4.

IMPROVEMENT OF HAMPTON ROADS, VIRGINIA.

Under a contract 38,642 cubic yards, scow measurement, of soft mud were excavated during the fiscal year in maintaining the northerly section of the channel across Middle Ground bar by dredging to a depth of 30 feet at mean low water. The excavated material was towed to and deposited at the authorized dumping ground on Willoughby bank, distant about 8½ miles from the site of the work.

The rate for the dredging done was 14.3 cents per cubic yard, scow measurement, of material dredged and dumped, and the cost, including contingent expenses, amounted to $6,419.48.

This channel is regarded as being worthy of maintenance until the completion of the project adopted by the river and harbor act of June 25, 1910.

APPROPRIATIONS.

June 13, 1902	$10,000
March 3, 1903	215,000
March 2, 1907	12,500
Total	287,500

CONTRACT IN FORCE.

With L. M. Lewis Dredging Company (Incorporated), for dredging, dated October 16, 1908; approved October 21, 1908; date for commencing work, December 5, 1908; date for completing work, May 5, 1909 (time limit waived). Price, 14.3 cents per cubic yard, scow measurement.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	[a] 610	[a] 672	[a] 1,282	[a] 1,158,922	[b] 79
Sailing	[a] 8	(c)	(c)	(c)	(c)

[a] Only clearances through custom-house at Newport News, Va.
[b] To and from foreign ports.
[c] Not known.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.
Coal	In bulk	4,616,859
Grain	1,062,633 bushels	31,879
Miscellaneous [a]		3,042,666
Total		7,691,404

[a] Includes flour, oil cake, logs, lumber, tobacco, lard, oleomargarine, cotton-seed oil, chemicals, fertilizer, wine, salted fish, iron, seeds, coffee, stones, rags, waste paper, straw covers, dry goods, groceries, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Average haul or distance freight was carried, not known.
Rate per ton-mile, not known.

Approximate amount of freight handled by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1901	3,736.443	1906	5,544,086
1902	2,663,669	1907	6,379,617
1903	2,826,558	1908	6,354,774
1904	4,208,781	1909	7,691,404
1905	4,717,858		

L 5.

IMPROVEMENT OF NANSEMOND RIVER, VIRGINIA.

Between March 25, 1910, and April 2, 1910, the U. S. snag boat *Roanoke* removed from the channel of the river 53 logs, 1 pile, and 1 snag, which obstructed navigation in the vicinity of Suffolk, Va. This maintenance work cost $206, and no other operations were carried on during the fiscal year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $3,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Amount appropriated for previous projects from 1873 to 1878 (see H. Doc. No. 421, 57th Cong., 2d sess.)	$37,000
August 11, 1888	10,000
September 19, 1890	10,000
July 13, 1892	10,000
August 15, 1894	10,000
June 3, 1896	5,000
March 3, 1899	5,000
March 2, 1907	5,000
June 25, 1910	5,000
Total	97,000

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	[b] 5	1,094	6,369

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Brick	8,400,000	21,000	$42,000
Clay	In bulk	28,000	14,000
Coal	do	6,610	21,525
Ice	13,334 cakes	2,000	3,000
Lumber	10,000,000 feet	25,000	250,000
Shells, oyster	100,000 bushels	2,500	2,500
Empty truck packages		360	7,000
Miscellaneous[c]		10,781	
Total		96,251	

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Steamers made 306 round trips during the calendar year 1909.

[c] Includes agricultural products, groceries, dry goods, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1888	109,900	1900	16,693
1890	217,338	1901	119,892
1891	78,572	1902	50,950
1892	133,723	1903	36,127
1893	59,473	1904	22,119
1894	53,762	1905	77,204
1895	59,701	1906	91,063
1896	61,405	1907	156,200
1897	43,500	1908	132,292
1898	31,796	1909	[a] 96,251

[a] Decrease probably due to discontinuance of regular steamboat for about one month and to near exhaustion of forests in vicinity of river.

L 6.

IMPROVEMENT OF PAGAN RIVER, VIRGINIA.

There were no operations and no expenditures during the fiscal year, no funds being available.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Amount appropriated for previous projects from 1880 to 1902 (see H. Doc. 421, 57th Cong., 2d sess.)	$20,870.00
June 25, 1910	4,600.00
Total	25,470.00
Amount turned into surplus fund of the Treasury from the act of June 13, 1902	198.99
Aggregate	25,271.01

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	[b] 9	2,488	29,995

[a] Exclusive of the balance unexpended July 1, 1910.
[b] Steamers made 668 round trips during the calendar year 1909.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Horses and mules	100 head	50	$15,000
Oysters	10,000 bushels	500	5,000
Peanuts	941,000 bags	47,050	2,355,100
Vehicles	Not known	25	5,000
Wood	800 cords	1,200	2,000
Miscellaneous [a]	Not known	35,599	
Total		84,424	

[a] Includes agricultural products, groceries, dry goods, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1901	108,058	1906	87,505
1902	75,614	1907	89,289
1903	120,121	1908	84,108
1904	85,078	1909	84,424
1905	82,207		

L 7.

IMPROVEMENT OF APPOMATTOX RIVER, VIRGINIA.

(A) GENERAL IMPROVEMENT.

Under an emergency contract 15,977 cubic yards, place measurement, of sand and mud were removed between July 1, 1909, and August 4, 1909, in dredging shoals at a point 1½ miles below Petersburg, and a point 3½ miles farther downstream.

The material removed was pumped ashore, behind dikes and in sloughs, at various points where the space was available. The contract price was 25 cents per cubic yard, place measurement, and the total cost, including contingencies, was $4,773.96, for maintenance of the channel.

(B) AT PETERSBURG.

Under a contract the following work was done during the fiscal year toward completing the work under the project: Excavation of earth from channel and under new highway bridge, 300 cubic yards, place measurement, at 50 cents per cubic yard, or a contract cost of $150; 200 cubic yards, place measurement, of rock were excavated other than near railroad piers, at $5.50 per cubic yard, or a contract cost of $1,100, and 18,027 cubic yards, place measurement, of earth placed in shaping up levee, at 50 cents per cubic yard, or a contract cost of $9,013.50. This work is under continuing contract, but no payment has been made thereunder, as funds therefor were only recently appropriated.

APPROPRIATIONS.

March 3, 1871	$50,000.00
June 10, 1872	40,000.00
March 3, 1873	30,000.00
June 23, 1874	30,000.00
March 3, 1875	30,000.00
August 14, 1876	30,000.00
June 18, 1878	30,000.00
March 3, 1879	20,000.00
June 14, 1880	20,000.00
March 3, 1881	20,000.00
August 2, 1882	35,000.00
July 5, 1884	25,000.00
August 5, 1886	18,750.00
August 11, 1888	15,000.00
September 19, 1890	15,000.00
July 13, 1892	15,080.00
August 18, 1894	5,000.00
June 3, 1896	5,000.00
March 3, 1899	5,000.00
June 13, 1902	32,500.00
March 3, 1903	175,000.00
March 3, 1905	10,000.00
March 2, 1907	50,000.00
June 25, 1910	93,000.00
“Emergencies in River and Harbor Works:”	
June 6, 1900 (allotment of Sept. 23, 1903)	$5,000.00
April 28, 1904 (allotment of Oct. 28, 1904)	12,000.00
March 2, 1907 (allotment of Sept. 1, 1908)	10,000.00
“Preservation and Maintenance of River and Harbor Works:”	
Act of March 3, 1909 (allotment of Apr. 10, 1909)	5,000.00
Total	831,330.00
Repaid to appropriation for “Emergencies in River and Harbor Works”	7,131.70
Aggregate	824,198.30

CONTRACTS IN FORCE.

(A) GENERAL IMPROVEMENT.

Emergency: With Atlantic Dredging Company, for dredging, dated June 21, 1909; date for commencing work, July 20, 1909; date for completion of work, October 20, 1909; price, 25 cents per cubic yard, measured in place.

(B) AT PETERSBURG.

With L. M. Lewis Dredging Company (Incorporated) dated October 12, 1909; approved November 5, 1909; work to be commenced December 10, 1909; work to be completed February 10, 1911. Prices: For excavation of earth from the channel and from under new highway bridge, 50 cents per cubic yard, measured in place; for excavation of rock near piers of railroad bridge, $10 per cubic yard, measured in place; for excavation of rock other than near piers of railroad bridge, $5.50 per cubic yard, place measurement; for shaping up levee, 50 cents per cubic yard, place measurement; for removal of bulkhead, $750; for flume, $12.50 per linear foot; for revetment, $1.30 per square yard.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Passengers.
Registered steamers	[a] 794	10,000

[a] This is probably the 2 regular steamers, or others running in their place, operating regularly on the river, and the number represents the trips made during the year to Petersburg.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Guano, fish scrap, lumber, and wood [a]	Not known	32,370	$324,300
Miscellaneous [b]	.....do.....	6,119	305,950
Total		38,489	630,250

[a] Impossible to secure separate quantities of each article named.
[b] Includes groceries, dry goods, and other manufactured articles, the exact quantities of each of which it has been impossible to ascertain.

During the year a new steamboat route was established on the river, the initial points being Petersburg, Va., and Richmond, Va. One steamer runs to schedule, making one round trip daily between points named.

Approximate amount of freight handled by water during previous years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1888	30,626	1901	145,509
1889	26,121	1902	100,648
1890	21,693	1903	103,628
1891	26,275	1904	42,337
1892	25,218	1905	53,282
1896	81,318	1906	30,438
1897	84,031	1907	(a)
1898	95,941	1908	31,830
1899	(a)	1909	38,489
1900	155,745		

[a] Not obtained.

L 8.

IMPROVEMENT OF HARBOR AT CAPE CHARLES CITY, VIRGINIA.

No operations were carried on during the fiscal year. The expenditures were for office expenses.

This harbor is considered worthy of further improvement to the extent required by the adopted project.

APPROPRIATIONS.

September 19, 1890	$25,000
July 13, 1892	10,000
March 3, 1899	20,000
June 13, 1902	20,000
March 3, 1905	25,000
March 2, 1907	25,000
June 25, 1910	20,000
Total	145,000
Received by annulment of contract	$250
Aggregate	145,250

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	[a] 10	3,294	144,849

[a] Arrived at Cape Charles City during the calendar year 1909, 3,943 times and departed 3,942 times.

Eight barges, net registered tonnage 10,560, arrived at Cape Charles City an aggregate of 3,263 times and departed 3,262 times during the calendar year 1909.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.
Miscellaneous and farm products [a]	Not known	2,355,984
Total		2,355,984

[a] Includes lumber, agricultural products, groceries, dry goods, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain, and also the value.

Approximate amount of freight handled by water during the various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1890	390,207	1901	940,646
1891	319,164	1902	1,031,598
1892	341,269	1903	1,155,952
1893	393,352	1904	1,404,146
1894	427,723	1905	1,512,798
1895	455,269	1906	1,723,635
1896	487,004	1907	2,121,301
1898	509,894	1908	1,811,731
1899	591,298	1909	2,355,984
1900	([a])		

[a] No statement.

L 9.

IMPROVEMENT OF ONANCOCK RIVER, VIRGINIA.

There were no funds available for expenditure on this improvement, which was revived by the act of June 25, 1910.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Amount appropriated for previous projects (see H. Doc. No. 421, 57th Cong., 2d sess.)	$20,511.00
June 25, 1910	13,500.00
Total	34,011.00

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered steamers	3	1,740

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Agricultural products	Not known	20,493	$819,720
Coal	In bulk	1,250	7,500
Fish and oysters	Not known	378	15,120
Lumber	1,547,325 feet	7,893	236,790
Poultry and live stock	Not known	1,135	227,000
Miscellaneous [a]	do	15,970	1,597,000
Total		47,119	2,903,130

[a] Includes groceries, hardware, agricultural implements, dry goods, and miscellaneous manufactured articles the exact quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during various years.

	Short tons.
1890	18,504
1891	12,687
1892	44,009
1909	47,119

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[a] Exclusive of the balance unexpended July 1, 1910.

L 10.

IMPROVEMENT OF WATERWAY FROM NORFOLK, VIRGINIA, TO THE SOUNDS OF NORTH CAROLINA.

Under a contract 271 cubic yards, place measurement, of mud and sand were removed during the fiscal year from Deep Creek section in maintaining the adopted project width and depth of channel. The contract price was 17 cents per cubic yard, place measurement, of material removed and pumped ashore. The work covered by the contract mentioned was completed on July 1, 1909. The cost of the dredging done during the fiscal year, including contingencies, was $51.07. Other expenditures during the fiscal year were for payment of outstanding liabilities June 30, 1909, of percentages retained from payments made under contract for dredging and contingencies.

The maintenance of the through channel, with its present project dimensions, is all that is considered worthy of being undertaken unless provision is made for an increased width and depth in the canal, now owned by private parties, which forms a part of this inland route.

APPROPRIATIONS.

March 3, 1899	$25,000
June 6, 1900	200,000
March 3, 1901	29,870
March 3, 1905	3,000
March 2, 1907	5,000
June 25, 1910	5,000
Total	267,870

CONTRACT IN FORCE.

Emergency: With Atlantic Dredging Company, for dredging, dated February 5, 1909; date for commencing work, February 15, 1909; date for completing work, May 15, 1909 (time limit waived). Price, 17 cents per cubic yard, place measurement.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered:		
Steamers	1,223	98,850
Sailing	829	44,261

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Fence rails	4,705	247,880	$1,851,670
Headings	216,884		
Mine props	20,215		
Laths	1,603,750		
Logs	17,338		
Do	12,354 cords		
Do	5,051,621 feet		
Lumber	96,940,864 feet		
Piles	765,368 feet		
Shingles	8,476,500		
Staves	5,203,400		
Ties	9,537		
Wood	4,214 cords		
Cement	1,848 tons	113,775	3,818,400
Coal	7.591 tons		
Corn	82,742 bushels		
Fertilizer	29,231 tons		
General cargo	56,929 tons		
Hay	20 tons		
Junk	241 tons		
Melons	28,800		
Miscellaneous	97 tons		
Oil barrels	423		
Oysters	37,160 bushels		
Peanuts	1,600 bushels		
Peas	1,200 bushels		
Potatoes	32,199 bushels		
Salt	3,744 tons		
Sand and gravel	2,229 tons		
Shells, oyster	111,014 bushels		
Truck barrels	5,000		
Total		361,655	5,670,070

Average haul or distance freight was carried, not known.
Rate per ton-mile, not known.
Impossible to ascertain the separate valuation of the articles stated.

Approximate amount of freight shipped and received by water during various years.

Year.	Quantity.
	Short tons.
1907	366,339
1908	319,573
1909	361,655

Until the calendar year 1907 it was not practicable to compile the commerce in tons.

L II.

IMPROVEMENT OF INLAND WATER ROUTE FROM NORFOLK HARBOR, VIRGINIA, TO ALBEMARLE SOUND, NORTH CAROLINA, THROUGH CURRITUCK SOUND.

The U. S. snag boat *Roanoke* was employed from April 6, 1910, to June 1, 1910, in removing channel obstructions. From the North Landing River, 279 logs, 14 snags, 7 stumps, and 1 tree; from Currituck Sound, 24 logs; from Coinjock Bay, 42 logs and 2 stumps; from North River, 69 logs and 2 piling were removed and deposited at convenient points. This work cost, including contingencies, $1,842.49.

The maintenance of the through channel with its present project dimensions is all that is worthy of being undertaken, unless provision is made for an increased width and depth in the canal, now owned by private parties, which forms a part of this inland route.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $2,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

For Southern Branch Elizabeth River, Virginia: Appropriated from 1873 to 1878 (see H. Doc. No. 421, 57th Cong., 2d sess.)		$40,000.00
For North Landing River, Virginia and North Carolina: Appropriated from 1879 to 1882 (see H. Doc. No. 421, 57th Cong., 2d sess.)		55,500.00
For Currituck Sound, Coinjock Bay, and North River bar, North Carolina: Appropriated from 1878 to 1888 (see H. Doc. No. 421, 57th Cong., 2d sess.)		142,500.00
For inland water route, etc.:		
September 19, 1890	$10,000.00	
July 13, 1892	9,000.00	
August 18, 1894	10,000.00	
June 3, 1896	10,000.00	
March 3, 1899	8,000.00	
June 13, 1902	23,400.00	
March 3, 1905	22,000.00	
March 2, 1907	3,000.00	
June 25, 1910	5,000.00	
		100,400.00
"Preservation and maintenance of river and harbor works:"		
Act of March 3, 1909, allotment of April 10, 1909		1,500.00
Total		339,900.00
Amount received from sale of property		2,340.69
Aggregate		342,240.69

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.
Registered:	
Steamers	2,067
Sailing	343
Unregistered rafts	212

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.
Miscellaneous [b]	Not known.	195,237

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Includes forest products, agricultural products, groceries, dry goods, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight shipped and received by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1900	195,958	1905	88,580
1901	210,264	1906	100,000
1902	199,062	1907	188,543
1903	203,812	1908	133,081
1904	144,041	1909	195,237

L 12.

IMPROVEMENT OF PERQUIMANS RIVER, NORTH CAROLINA.

No operations were carried on during the fiscal year. The expenditures were for office expenses.

This stream is considered worthy of further improvement by the maintenance of the existing channel which is believed to be sufficient for the needs of present and prospective commerce.

APPROPRIATIONS.

Appropriated in 1876 (see H. Doc. No. 421, 57th Cong., 2d session)	$2,500
March 3, 1905	11,250
Total	13,750

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered steamers	[a] 2	25

[a] Ran on schedule to points on the river.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Cotton	1,750 bales	350	$85,000
Cotton seed	24,000 bags	1,200	40,000
Fertilizer	15,000 bags	1,500	35,000
Fish, fresh	9,000 boxes	450	50,000
Hay	3,429 bales	300	6,000
Ice	1,333 cakes	200	1,000
Lumber	7,953,200 feet	19,883	120,350
Peanuts	6,000 bags	300	25,000
Truck	Not known	1,200	90,000
Miscellaneous [a]	do	2,000	100,000
Total		27,383	552,350

[a] Includes dry goods, groceries, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1904	38,300	1907	69,600
1905	50,375	1908	13,100
1906	108,570	1909	27,383

L 13.

IMPROVEMENT OF BLACKWATER RIVER, VIRGINIA.

No operations were carried on during the fiscal year. The expenditures were for repair and care of United States plant.

This stream is not considered worthy of improvement to a greater extent than now contemplated, as this is sufficient for present needs of navigation. The unexpended balance, however, should be retained to be applied when work of maintenance is necessary.

APPROPRIATIONS.

Appropriated from 1878 to 1882 (see H. Doc. No. 421, 57th Cong., 2d sess.)	$14,000
March 2, 1907	8,000
Received from sales	15
Total	22,015

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamer	[a]1	131	563

[a] This steamer made 104 round trips during the calendar year 1909.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
Miscellaneous[a]	Not known	5,413	$866,080

[a] Forest and agricultural products, fertilizer, dry goods, groceries, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during the various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1906	5,200	1908	5,390
1907	5,300	1909	5,413

L 14.

IMPROVEMENT OF MEHERRIN RIVER, NORTH CAROLINA.

No operations were carried on during the fiscal year. The expenditures were for repair and care of United States plant.

This stream is not considered worthy of improvement to a greater extent than now contemplated, as this is sufficient for present needs of navigation. The unexpended balance, however, should be retained, to be applied when work of maintenance is necessary.

APPROPRIATIONS.

Appropriated in 1882 (see H. Doc. No. 421, 57th Cong., 2d sess.)	[a]$5,000
March 2, 1907	6,000
Received from sales	10
Total	11,010

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	[b]2	259	5,231

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Logs, pine	34,042	6,400	$33,000
Miscellaneous[c]	Not known	8,402	1,092,260
Total		14,802	1,125,260

Approximate amount of freight handled by water during the various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1906	8,900	1908	8,690
1907	9,321	1909	14,802

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[a] Of this amount $415.47 was carried to the surplus fund.

[b] One steamer made 153 round trips during calendar year 1909.

[c] Includes cotton, cotton seed, fertilizer, groceries, dry goods, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

L 15.

IMPROVEMENT OF ROANOKE RIVER, NORTH CAROLINA.

No operations were carried on during the fiscal year. The expenditures were for repair and care of United States plant.

This stream is not considered worthy of improvement to a greater extent than now contemplated, as this is sufficient for present needs of navigation. The unexpended balance, however, should be retained to be applied when work of maintenance is necessary.

APPROPRIATIONS.

March 3, 1871	$20,000.00	August 18, 1894	$30,000.00
June 10, 1872	10,000.00	June 3, 1896	10,000.00
March 3, 1873	10,000.00	March 3, 1905	10,000.00
June 23, 1874	5,000.00	March 2, 1907	3,000.00
August 2, 1882	5,000.00	June 25, 1910	5,000.00
July 5, 1884	3,000.00		
August 5, 1886	20,000.00	Total	246,000.00
August 11, 1888	40,000.00	Amount received from sales of property	1,361.50
September 19, 1890	25,000.00		
July 13, 1892	50,000.00	Aggregate	247,361.50

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	[a] 3	531	2,000

[a] These steamers made 239 round trips during the calendar year 1909.

In addition to the vessels given above, one barge, net registered tonnage 217 tons, made 24 round trips during the calendar year to points on the river.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Cotton	8,925 bales	1,785	$357,000
Cotton seed	39,900 bags	1,995	39,900
Fertilizer	41,260 bags	4,626	92,540
Field peas	35,816 bushels	1,074	53,700
Logs	103,021	19,368	58,636
Lumber	10,467,574 feet	25,590	208,329
Peanuts	117,380 bags	5,869	293,500
Other building materials	Not known	2,700	25,000
Miscellaneous [a]	do	5,106	255.300
Total		68,113	1,383,905

[a] Includes groceries, dry goods, agricultural implements, and other manufactured articles, the quantities of each of which it has been impossible to ascertain.

Approximate amount of freight handled by water during the various years.

Year.	Quantity.	Year.	Quantity.
	Short tons.		*Short tons.*
1870	150,000	1904	32,790
1890	182,000	1905	([a])
1891	376,181	1906	88,508
1900	27,432	1907	61,108
1901	226,736	1908	78,775
1902	163,564	1909	68,113
1903	115,875		

[a] Not complete.

L 16.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

(*a*) *Wreck of schooner Wm. Henry.*—The sum of $1,000 was provided July 15, 1909, to remove the wreck of the schooner *Wm. Henry*, which was abandoned in Hampton Roads off the south beach at Fort Monroe, Va.

A contract was entered into with W. C. Booker, of Norfolk, Va., to do the work for $450, and the work thereunder was commenced in the latter part of August, 1909, and completed in September, 1909, the wreck being destroyed by explosives. The cost of removing the wreck was $592.16.

(*b*) *Wreck of sloop Lucy.*—The sum of $300 was provided September 21, 1909, to remove the wreck of the sloop *Lucy* from the channel of Pagan River, off Battery Park, Va.

Proposals were invited for the work, and award was made to the lowest bidder, R. Curtis & Co., of Norfolk, Va. The firm satisfactorily performed the work by hauling the sloop out and destroying it in the latter part of September, 1909. The cost of removing the wreck was $147.75.

(*c*) *Wreck of barge John J. McNally.*—The barge *John J. McNally*, sank in the Sewall Point channel of Norfolk Harbor, Virginia, and $3,000 was provided January 22, 1910, to remove the wreck of the barge from the channel.

Proposals were invited for removing the wreck of the said barge, and award therefor was made to the lowest bidder, the Coastwise Dredging Company, of Norfolk, Va., to do the work for $2,300, and the wreck of the barge was destroyed by explosives during February, 1910. The cost of the removal of the wreck was $2,558.96.

CONTRACT IN FORCE.

Emergency contract: (*a*) With W. C. Booker, of Norfolk, Va., for removing wreck of Schooner *Wm. Henry*, dated August 24, 1909; date for commencing work, September 3, 1909; date for completing work, October 18, 1909. Price, $450.

APPENDIX M.

IMPROVEMENT OF CERTAIN RIVERS AND HARBORS IN THE WILMINGTON, NORTH CAROLINA, DISTRICT.

REPORT OF CAPT. EARL I. BROWN, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Scuppernong River, North Carolina.
2. Shallowbag Bay, North Carolina.
3. Fishing Creek, North Carolina.
4. Waterway connecting Swan Quarter Bay with Deep Bay, North Carolina.
5. Pamlico and Tar rivers, North Carolina.
6. Bay River, North Carolina.
7. South River, North Carolina.
8. Contentnia Creek, North Carolina.
9. Smiths Creek, North Carolina.
10. Neuse and Trent rivers, North Carolina.
11. Swift Creek, N. C.
12. Inland waterway from Pamlico Sound to Beaufort Inlet, North Carolina.
13. Inland waterway between Newbern and Beaufort, North Carolina.
14. Harbor at Beaufort, North Carolina.
15. Beaufort Inlet, North Carolina.
16. Harbor at Morehead City, North Carolina.
17. New River, including inland waterways between Beaufort Harbor and New River and between New River and Swansboro, North Carolina.
18. Northeast (Cape Fear) and Black rivers, and Cape Fear River above Wilmington, North Carolina.
19. Cape Fear River above Wilmington, N. C. (locks and dams).
20. Cape Fear River, North Carolina, at and below Wilmington.

United States Engineer Office,
Wilmington, N. C., July 19, 1910.

Sir: In compliance with General Orders, No. 7, May 23, 1910, I have the honor to forward the anual reports for the Wilmington, N. C., district for the fiscal year 1910.

Very respectfully, your obedient servant,

Earl I. Brown,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

M 1.

IMPROVEMENT OF SCUPPERNONG RIVER, NORTH CAROLINA.

Reference.—See page 329 of current summary.

The dredge *Scuppernong* and steamer *Thom* began work on this improvement September 7, 1909, and continued on same until November 9, 1909, removing 42,687 cubic yards of mud and sand from a cut 3,400 feet long, 9 feet deep, and 150 feet wide at the mouth, completing the project, and restoring deteriorated portions of the channel to project width and depth.

The cost of the year's work was $4,248.68, of which $2,500 was for maintenance and $1,748.68 for improvement. Included in the above is $250 received for rent of plant.

The cost is made up as follows:

Operating dredge and plant	$3,862.15
Towing plant	250.00
Superintendence	136.53
Total	4,248.68

making the cost 10 cents per cubic yard.

APPROPRIATIONS.

Prior to present project, June 13, 1902 (see H. Doc. 421, 57th Cong., 2d sess.)	$8,000
June 13, 1902	10,000
March 3, 1905	5,000
March 2, 1907	2,000
March 3, 1909 (allotment from appropriation "Preservation and maintenance of river and harbor works")	2,500
June 25, 1910	2,500
Total	30,000
Receipts from rents	250

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	3	560	1,400
Sailing	15	1,125	....
Tug	1	65	....
Total	19	1,750	1,400

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).
UPSTREAM.				
Brick	55.5 thousand	139	$417	6
Coal and minerals	35 tons	35	175	5
Cotton-seed meal	5 tons	5	125	5
Fertilizers	345 tons	345	10,350	7
Fish	65 barrels	3	240	5
General merchandise	2,055 tons	2,055	287,700	5
Grain	700 bushels	18	630	5
Hay	2,014 bales	101	2,020	5
Horses	91 head	46	9,200	5
Lumber	100,000 feet b. m	200	2,000	5
Machinery	5 tons	5	500	5
Potatoes	1,500 bushels	45	900	5
Tar	34 barrels	5	75	6
Timber	150,000 feet b. m	600	2,400	5
Vegetables	520 barrels	26	520	5
Total		3,628	317,252	
DOWNSTREAM.				
Cattle	690 head	173	10,380	6
Cotton	350 bales	99	23,760	6
Eggs	1,400 crates	28	11,200	7
Fish	150 barrels	8	640	5
Hogs	1,900 head	57	5,700	5
Lumber	7,385,000 feet b. m	14,770	147,700	15
Poultry	11,345 head	23	4,600	6
Peanuts	7,185 bushels	108	6,480	5
Potatoes	42,390 bushels	1,271	25,420	6
Shingles	615 thousand	308	2,464	5
Vegetables	768 barrels	38	760	5
Wood	45 cords	45	45	14
Total		16,928	239,149	
RECAPITULATION.				
Total upstream		3,628	317,252	
Total downstream		16,928	239,149	
Total		20,556	556,401	

There are no rates to the mouth of the river. Most of the tonnage goes to and comes from northern points and it is impracticable to obtain rates.

M 2.

IMPROVING SHALLOWBAG BAY, NORTH CAROLINA.

Reference.—See page 330 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATIONS.

June 25, 1910	$13,750

M 3.

IMPROVEMENT OF FISHING CREEK, NORTH CAROLINA.

Reference.—See page 331 of current summary.

There was no work done during the year, no money being available.

This stream is worthy of further improvement to the extent of maintaining the present channel by snagging.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

September 19, 1890	$10,000
July 13, 1892	5,000
March 3, 1899	7,750
June 13, 1902	2,000
March 3, 1905	$500
June 25, 1910	1,500
Total	26,750

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered steamers	2	103
Total	2	103

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton mile.
UPSTREAM.					
Cotton-seed meal	120 tons	120	$3,000	18	$0.025
Fertilizers	414 tons	414	8,280	18	.025
Total		534	11,280		
DOWNSTREAM.					
Cotton seed	13,300 bushels	266	5,320	18	.025
Timber	500,000 feet b. m.	1,500	6,000	18	Cargo.
Total		1,766	11,320		
RECAPITULATION.					
Total upstream		534	11,280		
Total downstream		1,766	11,320		
Total		2,300	22,600		

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[a] Exclusive of the balance unexpended July 1, 1910.

M 4.

WATERWAY CONNECTING SWAN QUARTER BAY WITH DEEP BAY, NORTH CAROLINA.

Reference.—See page 332 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATION.

June 25, 1910	$14, 575

M 5.

IMPROVEMENT OF PAMLICO AND TAR RIVERS, NORTH CAROLINA.

[One river, called Pamlico below, and Tar above Washington, N. C.]

Reference.—See page 332 of current summary.

Snagging was carried on by U. S. snag boat *Trent* from September 22, 1909, until October 15, 1909, when the work of the snag boat was interrupted by low water, and operations were suspended. In December, 1909, snagging was resumed and continued with a few interruptions until April 22, 1910, when operations were again suspended on account of exhaustion of funds.

There were removed from the channel, 228 large snags, 1¼ cords small snags, 91 stumps, 119 raft logs, 52 logs, 98 trees, 5 piles; from the banks, 1 cord of brush removed, and 52 trees pulled back. The hull of an old wreck was also removed from the channel at Greenville.

The cost of this work was $5,000, all for maintenance, distributed as follows:

Operating snag boat *Trent*	$2, 071. 27
Special repairs to snag boat *Trent*	803. 65
Newbern Yard, rent and watching	345. 88
Surveys	862. 94
Local superintendence	720. 48
Wilmington office expenses	195. 78
Total	5, 000. 00

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5, 000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Date.	Amount.	Aggregate.	Date.	Amount.	Aggregate.
Prior to present project of 1875 (see H. Doc. 421, 57th Cong., 2d sess.)	$15,000	$15,000	July 13, 1892	$10,000	$88,000
			August 18, 1894	10,000	98,000
			June 3, 1896	5,000	103,000
			March 3, 1899	15,000	118,000
August 14, 1876	15,000	15,000	June 13, 1902	35,500	153,500
May 3, 1879	6,000	21,000	March 3, 1905	8,000	161,500
June 14, 1880	9,000	30,000	March 2, 1907	11,563	173,063
March 3, 1881	8,000	38,000	March 3, 1909 (allotment from appropriation "Preservation and maintenance of river and harbor works")	5,000	178,063
August 2, 1882	10,000	48,000	June 25, 1910	5,000	183,063
July 5, 1884	5,000	53,000			
August 5, 1886	5,000	58,000			
August 11, 1888	10,000	68,000			
September 19, 1890	10,000	78,000			

Sales, refundments, etc	$172.75
Rents	125.00
Total	297.75

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers[a]	42	830	1,819
Sailing	125	4,375	....
Barges	30	9,000	....
Total	197	14,205	1,819

[a] This includes gasoline boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Cattle	790 head	197	$11,850	30	$0.033
Coal and minerals	3,338 tons	3,338	16,690	30	.033
Cotton	7,140 bales	1,785	428,400	28	.07
Cotton seed	64,560 bushels	1,614	32,280	17	.059
Cotton-seed meal	442 tons	442	11,050	7	.107
Cotton-seed hulls	50 tons	50	1,250	8	.125
Eggs	2,680 crates	54	21,600	19	.292
Fertilizer	20,410 tons	20,410	612,300	28	.036
Fish	20,270 barrels	1,013	81,040	29	.07
General merchandise	5,246 tons	5,246	734,440	26	.115
Grain	39,468 bushels	987	34,545	19	.084
Hay	9,400 bales	470	9,400	27	.04
Hogs	1,000 head	30	3,000	30	.555
Machinery	25 tons	25	2,500	3	.333
Oysters	25,000 bushels	1,250	25,000	30	Cargo.
Poultry	81,000 head	162	32,400	29	.147
Peanuts	1,155 bushels	17	1,020	18	.111
Potatoes	238,431 bushels	7,152	143,060	18	.062
Shingles	7,500	4	32	22	.036
Timber	24,200,000 feet b. m.	72,600	290,400	29	Cargo.
Vegetables	11,800 packages	590	11,800	18	.111
Wood	300 cords	300	1,200	18	.055
Total	....	117,736	2,505,257	....	....

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
DOWNSTREAM.					
Brick	50,000	125	$375	30	$0.027
Coal and minerals	75 tons	75	375	30	.033
Cotton	1,452 bales	363	87,120	14	.117
Cotton seed	83,480 bushels	2,087	41,740	23	.043
Cotton-seed oil	3,422 barrels	800	112,000	19	.04
Cotton-seed meal	520 tons	520	13,000	13	.06
Cotton-seed hulls	451 tons	451	11,275	39	.026
Eggs	100 crates	2	800	8	.937
Fertilizer	525 tons	525	15,750	11	.091
Fish	600 barrels	30	2,400	30	.067
General merchandise	8,205 tons	8,205	1,148,700	27	.111
Grain	660 bushels	13	455	26	.061
Hay	5,600 bales	280	5,000	28	.039
Horses	240 head	120	24,000	30	.067
Lumber	62,768,000 feet b. m	125,536	1,255,360	26	Cargo.
Machinery	185 tons	185	18,500	27	.074
Poultry	1,800 head	4	800	8	.52
Potatoes	315 bushels	9	180	8	.139
Shingles	1,750,000	875	7,000	29	.031
Tar	392 barrels	59	885	20	.083
Timber	16,967,000 feet b. m	50,901	203,604	27	Rafted.
Vegetables	300 packages	15	300	8	.111
Ice	1,600 tons	1,600	16,000	30	.033
Total		192,816	2,966,219		
RECAPITULATION.					
Total upstream		117,736	2,505,257		
Total downstream		192,816	2,966,219		
Total		310,542	5,560,166		

There is an apparent decrease in tonnage over last year, but it is believed that there was no actual decrease, but that the figures for last year were too high, owing to the difficulty in collecting statistics.

M 6.

IMPROVING BAY RIVER, NORTH CAROLINA.

Reference.—See page 334 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATION.

June 25, 1910	$21,000

M 7.

IMPROVING SOUTH RIVER, NORTH CAROLINA.

Reference.—See page 335 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATION.

June 25, 1910	$16,000

M 8.

IMPROVEMENT OF CONTENTNIA CREEK, NORTH CAROLINA.

Reference.—See page 335 of current summary.

Snagging operations were commenced with a small hand hoister on July 13, 1909, and continued until August 18, 1909, when operations were suspended on account of lack of funds. Under an emergency allotment, operations were resumed with this hoister on January 21, 1910, and continued until March 17, 1910. The snag boat *Trent* also worked a few days in March, leaving the work on the 12th, and the hoister leaving on the 17th, owing to the exhaustion of funds.

The following obstructions were removed during the year: From the channel, 132 large snags, 25 stumps, 19 saw logs, 7 logs, 81 trees, 4 cords of brush, and 3 cords of small snags; and from the banks, 126 trees were hauled back, 40 trees trimmed, and 18¾ cords of brush removed.

All of this work was for maintenance, and its cost was as follows:

Operating hand hoister	$1,148.26
Operating snag boat *Trent*	194.80
Superintendence and office expenses	106.14
Total	1,449.20

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Date.	Amount.	Aggregate.
March 3, 1881	$10,000	$10,000
August 2, 1882	10,000	20,000
July 5, 1884	5,000	25,000
August 5, 1886	15,000	40,000
August 11, 1888	5,000	45,000
September 19, 1890	7,000	52,000
July 13, 1892	7,000	59,000
August 18, 1894	10,000	69,000
March 3, 1899	2,000	71,000
Allotted from emergency appropriation, act of June 13, 1902	500	71,500
Alloted January 27, 1905, from emergency appropriation, act of April 28, 1904	$500	$72,000
March 3, 1905	1,000	73,000
March 2, 1907	2,000	75,000
March 3, 1909 (allotted)	1,000	76,000
June 25, 1910	2,000	78,000

Rents, sales, etc.

Sales	$177
Rents	125
Total	302

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered steamers	6	221
Total	6	221

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Cotton-seed meal	1,675 tons	1,675	$41,875	17	$0.08
Fertilizers	4,750 tons	4,750	142,000	17	.081
General merchandise	445 tons	445	62,300	12	.178
Grain	3,640 bushels	91	3,185	24	.095
Hay	2,600 bales	130	2.600	21	.101
Timber	500,000 feet b. m	1,500	6,000	4	Cargo.
Total		8,591	257,960		
DOWNSTREAM.					
Cotton	2,250 bales	563	135,120	13	.163
Cotton seed	1,960 tons	1,960	39,200	18	.077
Potatoes	500 bushels	15	300	4	.415
Shingles	100,000	50	400	4	.15
Timber	4,500,000 feet b. m	13,500	54,000	30	Cargo.
Total		16,088	229,020		
RECAPITULATION.					
Total upstream		8,591	257,960		
Total downstream		16,088	229,020		
Total		24,679	486,980		

M 9.

IMPROVING SMITHS CREEK, NORTH CAROLINA.

Reference.—See page 336 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATIONS.

June 25, 1910	$16,250

M 10.

IMPROVEMENT OF NEUSE AND TRENT RIVERS. NORTH CAROLINA.

(A) NEUSE RIVER.

Reference.—See current summary, page 337.

The work of the year consisted of snagging and dredging, using government plant and hired labor.

The dredge *Scuppernong*, between July 1, 1909, and August 27, 1909, removed from the Western Channel 39,750 cubic yards of material, and 13 stumps, from a cut 2,080 feet long, 100 feet wide and 4 feet deep at dead low water, completing this channel.

All of this work was for improvement, and its cost was as follows:

Operating dredge and plant	$2,742.76
Rent and watching Newbern yard	186.44
Superintendence and office expenses	363.06
Total	3,292.26

making the cost 8.3— cents per cubic yard.

The snag boat *Trent* commenced snagging operations on January 28, 1910, and continued at work until March 3, 1910, when operations were suspended on account of exhaustion of funds. The following obstructions were removed: 67 large snags, 40 stumps, 88 trees, 8 saw logs, and 3 logs from the channel, and 38 trees hauled back from the banks.

All of this work was for maintenance, and its cost was as follows:

Operating snag boat *Trent*	$750.81
Rent and watching Newbern yard	52.00
Superintendence and office expenses	100.00
Total	902.81

The total cost of the year's work was $4,195.07, but from this amount should be deducted $246.33 received from sales and rent of plant, leaving the actual cost of the work $3,948.74.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Date.	Amount.	Aggregate.	Date.	Amount.	Aggregate.
June 18, 1878	$40,000	$40,000	June 13, 1902	[a] $13,500	$320,000
March 3, 1879	45,000	85,000			
June 14, 1880	45,000	130,000			
March 3, 1881	30,000	160,000			
August 2, 1882	30,000	190,000	Allotted from appropriation for emergencies in river and harbor works, act June 13, 1902	2,000	322,000
July 5, 1884	20,000	210,000			
August 5, 1886	22,500	232,500			
August 11, 1888	15,000	247,500			
September 30, 1890	20,000	267,500	Allotted from appropriation for emergencies in river and harbor works, act April 28, 1904	500	322,500
July 13, 1892	15,000	282,500	March 3, 1905	[a] 17,000	339,500
August 18, 1894	7,000	289,500	March 2, 1907	[a] 19,750	[b] 359,250
June 3, 1896	7,000	296,500	June 25, 1910 (allotted)	[a] 21,000	380,250
March 3, 1899	10,000	306,500			

[a] Allotted from combined appropriations for Neuse and Trent rivers, North Carolina.
[b] Increased $1,750, transferred from Trent River.

Rent, sales, etc.

Sales	$485.33
Rents	375.00
Total	860.33

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers[a]	35	1,050	1,150
Sailing	120	3,600	....
Barges	20	6,000	....
Total	175	10,650	1,150

[a] This includes gasoline boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Brick	40,000	100	$300	26	$0.031
Cattle	25 head	6	360	12	.333
Coal and minerals	9,205 tons	9,205	46,025	35	Cargo.
Cotton	1,460 bales	365	87,600	16	.092
Cotton seed	129,250 bushels	2,585	51,700	30	.046
Cotton-seed meal	2,220 tons	2,220	55,500	34	.031
Eggs	500 crates	10	4,000	12	.208
Fertilizers	54,465 tons	54,465	1,633,950	35	.041
General merchandise	8,740 tons	8.740	1,223,600	33	.061
Grain	165,390 bushels	4,135	144,725	35	.056
Hay	6,400 bales	320	6,400	30	.053
Hogs	100 head	3	300	12	.275
Lumber	100,000 feet b. m.	200	2,000	26	.029
Machinery	710 tons	710	71,000	35	.057
Oysters	35,000 bushels	1,750	35,000	33	.033

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM—continued.					
Poultry	36,000 head	72	$14,400	13	$0.16
Potatoes	2,850 bushels	86	1,720	17	.076
Rosin	3,300 barrels	528	13,200	20	.078
Shingles	100,000	50	400	26	.023
Turpentine, spirits	325 barrels	73	3,650	20	.056
Tar	1,500 barrels	225	3,375	20	.083
Timber	14,628,000 feet b. m	43,884	175,536	30	Rafted.
Vegetables	300 packages	15	300	12	.133
Total		129,747	3,575,041		
DOWNSTREAM.					
Brick	81,000	203	609	18	.041
Cattle	20 head	5	300	26	.154
Coal and minerals	60 tons	60	300	20	.075
Cotton	6,075 bales	1,519	364,500	34	.041
Cotton seed	3,675 tons	3,675	73,500	36	.034
Cotton-seed meal	806 tons	806	20,150	31	.044
Eggs	225 crates	5	2,000	11	.07
Fertilizers	850 tons	850	25,500	19	.053
General merchandise	10,200 tons	10,200	1,428,000	27	.074
Grain	8,130 bushels	203	7,105	20	.10
Hay	2,600 bales	130	2,600	18	.056
Hogs	25 head	1	100	31	.269
Lumber	78,325,000 feet b. m	156,650	1,566,500	35	Cargo.
Machinery	20 tons	20	2,000	20	.10
Poultry	3,600 head	7	1,400	16	.206
Potatoes	3,500 bushels	105	2,100	14	.118
Shingles	3,730,000	1,865	14,920	30	Cargo.
Tar	125 barrels	19	285	9	.184
Timber	31,950,000 feet b. m	95,850	383,400	33	Rafted.
Vegetables	150 packages	8	160	9	.222
Wood	500 cords	500	2,000	9	.17
Total		272,681	3,897,489		
RECAPITULATION.					
Total upstream		129,747	3,575,041		
Total downstream		272,681	3,897,489		
Total		402,428	7,472,530		

(B) TRENT RIVER.

Reference.—See page 339 of current summary.

The snag boat *Trent*, during September, 1909, removed from a shoal between the thirty-seventh and thirty-eighth mileposts by dredging 963 cubic yards, making a cut 535 feet long, 25 feet wide, and 3 to 4 feet deep.

The cost of this work was as follows:

Operating steamer *Trent* as a dredge	$406.35
Newbern yard, rent and watching	25.00
Local superintendence	56.61
Main office expenses	132.56
	620.52

making the cost 64+ cents per cubic yard.

Snagging operations were carried on by the *Trent* a few days in September, 1909, and from January 11 to 27, 1910. The following obstructions were removed from the channel between Newbern and Trenton: 89 snags, 20 stumps, 27 raft logs, 8 logs, and 21 trees; and from the banks, 62 trees hauled back and 3½ cords of brush removed.

The cost of this work was as follows:

Operating snag boat *Trent*	$379.53
Newbern yard, rent and watching	22.70
Local superintendence	55.00
Main office expenses	125.00
	582.23

The total cost of the year's work was $1,202.75, which was for maintenance.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $3,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Date.	Amount.	Aggregate.	Date.	Amount.	Aggregate.
March 3, 1879	$7,000	$7,000	June 3, 1896	$2,000	$66,500
June 14, 1880	10,000	17,000	March 3, 1899	2,500	69,000
March 3, 1881	5,000	22,000	June 13, 1902	[a] 6,500	75,500
August 2, 1882	10,000	32,000	Allotted from appropriation for emergencies in river and harbor works, act June 13, 1902	1,000	76,500
July 5, 1884	10,000	42,000	March 3, 1905	[a] 23,000	99,500
August 5, 1886	3,500	45,500	March 2, 1907	[a] 10,250	[b] 109,750
August 11, 1888	5,000	50,500	June 25, 1910 (allotted)	[a] 15,000	124,750
September 19, 1890	5,000	55,500			
July 13, 1892	5,000	60,500			
August 18, 1894	4,000	64,500			

[a] Allotted from combined appropriation for Neuse and Trent rivers, North Carolina.

[b] Reduced by $1,750, transferred to Neuse River. Received from sales, etc., $737.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers [b]	11	235	1,500
Total	11	235	1,500

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] This includes gasoline boats.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Brick	112,500	281.25	$843.75	38	$0.021
Coal	40 tons	40.00	280.00	38	.039
Cotton-seed meal	387 tons	387.00	9,675.00	30	.034
Fertilizers	3,675 tons	3,675.00	110,250.00	30	.03
Fish	100 barrels	5.00	400.00	38	.105
General merchandise	1,515 tons	1,515.00	212,100.00	32	.073
Grain	8,700 bushels	217.40	7,609.00	37	.032
Hay	210 tons	210.00	4,200.00	30	.037
Machinery	200 tons	200.00	20,000.00	36	.054
Shingles	550,000	275.30	2,202.40	38	.015
Oysters	125 bushels	6.25	125.00	38	.026
Peanuts	924 bushels	13.86	831.60	38	.052
Vegetables	7,920 packages	198.00	4,950.00	38	.105
Ice	40 tons	40.00	280.00	38	.053
Total		7,064.06	373,746.75		
DOWNSTREAM.					
Cattle	85 head	21.25	1,275.00	35	.038
Cotton	3,470 bales	867.50	208,200.00	29	.495
Cotton seed	594 tons	594.00	11,880.00	29	.030
Eggs	100 crates	2.00	800.00	38	.197
Hay	50 tons	50.00	1,000.00	18	.055
Hogs	60 head	1.80	180.00	38	.217
Lumber	225,000 feet b. m	450.00	4,500.00	38	.053
Poultry	400 crates	8.00	1,600.00	38	.263
Potatoes	11,480 bushels	348.00	6,960.00	33	.047
Shingles	500,000	250.00	2,000.00	23	.023
Wood	800 cords	800.00	3,200.00	38	.039
Timber	12,075,000 feet b. m.	36,225.00	144,900.00	34	Cargo.
Sand	3,500 tons	3,500.00	7,000.00	7	.071
Total		43,117.55	393,495.00		

IN NEWBERN HARBOR.

EXPORTS.					
Brick	6,000	15.00	$45.00		
Coal	125 tons	125.00	625.00		
General merchandise	3,207 tons	3,207.00	448,980.00		
Grain	30,000 bushels	750.00	26,250.00		
Hay	100 tons	100.00	2,000.00		
Lumber	34,000,000 feet b. m.	68,000.00	680,000.00		
Machinery	75 tons	75.00	7,500.00		
Potatoes	2,500 bushels	75.00	1,500.00		
Total		72,347.00	1,166,900.00		
IMPORTS.					
Brick	40,000	108.00	1,300.00		
Cattle	120 head	30.00	1,800.00		
Coal	8,500 tons	8,500.00	42,500.00		
Cotton	1,750 bales	437.50	105,000.00		
Cotton seed	150 tons	150.00	3,000.00		
Eggs	120 crates	2.40	960.00		
Fertilizers	4,100 tons	4,100.00	123,000.00		
Fish	11,000 boxes	1,100.00	88,000.00		
General merchandise	6,200 tons	6,200.00	868,000.00		
Grain	150,000 bushels	3,750.00	131,250.00		
Hay	300 tons	300.00	6,000.00		
Hogs	250 head	7.50	750.00		
Machinery	160 tons	160.00	16,000.00		
Oysters	30,000 bushels	1,500.00	30,000.00		
Poultry	400 crates	8.00	1,600.00		
Peanuts	1,980 bushels	29.70	1,782.00		
Potatoes	12,500 bushels	375.00	7,500.00		
Rosin	3,300 barrels	528.00	13,200.00		
Turpentine, spirits	325 barrels	48.75	2,437.50		
Timber	1,500,000 feet b. m	4,500.00	18,000.00		
Vegetables	2,500 packages	625.00	15,625.00		
Wood	1,550 cords	1,550.00	6,200.00		
Total		34,001.85	1,482,904.50		

Freight traffic—Continued.

RECAPITULATION.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
Total upstream		7,064.06	$375,746.75		
Total downstream		43,117.55	393,495.00		
Total exports		72,347.00	1,166,900.00		
Total imports		34,001.85	1,482,904.50		
Total		156,530.46	3,417,046.25		

M 11.

IMPROVING SWIFT CREEK, NORTH CAROLINA.

Reference.—See page 340 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATION.

June 25, 1910	$1,600

M 12.

INLAND WATERWAY FROM PAMLICO SOUND TO BEAUFORT INLET, NORTH CAROLINA.

Reference.—See page 341 of current summary.

The work of the year consisted of acquiring additional land for right of way, dredging under contract, and constructing a highway bridge over Core Creek under contract.

One tract of land (38.3 acres) was acquired by condemnation proceedings during the year. The remainder of the land will be acquired as soon as the claimants to the land in question prove their title thereto.

The cost of this land was as follows:

Purchase price	$381.50
Surveys	9.70
Legal expenses	8.25
	399.45
Cost last year	3,246.03
Total	3,645.48

Up to date there have been acquired 265.75 acres of land, at an average cost of $13.73 per acre.

The work of dredging for the waterway was as follows: Under contract with the Maryland Dredging and Contracting Company, of

Baltimore, Md., dredge *No. 9*, a 20-inch hydraulic dredge, and the dredge *Potomac*, a 15-inch hydraulic dredge, were at work at the beginning of the fiscal year. On August 8, 1909, the dipper dredge *Maryland* was placed on the work. On April 23 dredge *No. 10*, an 18-inch hydraulic, was put on the work in place of *No. 9*, which was withdrawn April 19. One locomotive crane was employed during the year in the swamp sections for building levees.

The amount of material dredged during the year was as follows:

	Cubic yards.
Removed from prescribed cross section	1,865,954
Removed from 1 foot outside	335,458
Removed from outside of cross-section	808,109

The cost of this work was as follows:

Contract cost of dredging	$218,620.92
Superintendence and surveys	6,326.37
Main office expenses	1,962.33
Plant	350.00
Total	227,259.62

The contract price was 10¾ cents per cubic yard for material removed from prescribed cross section, and 5⅜ cents for material removed from 1 foot outside. The total cost of the material removed from the prescribed cross section, including the allowable excess depth of 1 foot, was 10.3+ cents per cubic yard. In this cost no allowance has been made for the 808,109 cubic yards removed from outside of the prescribed cross section for which no payment was made. If this be added, it would make the cost of the material 7.6— cents per cubic yard.

Up to date the following work has been done under the contract:

	Cubic yards.
Removed from prescribed cross section	2,905,185
Removed from 1 foot outside	547,054
Removed from outside cross section	1,293,371

The cost of this work was as follows:

Contract cost of dredging	$341,711.54
Main office expenses	7,825.25
Superintendence and surveys	18,704.61
Plant	3,150.00
Total	371,391.40

The average cost to date for the material removed from the prescribed cross section and 1 foot outside is 10.8 cents per cubic yard. Including the amount dredged for which no payment was made, the actual cost would be 7.8 cents per cubic yard.

	Linear feet.
Length of channel completed during fiscal year	52,216.3
Length of channel completed last fiscal year	34,182.3
Total	86,398.6
Length of channel still to be excavated	9,128.4

The waterway is about 80 per cent completed.

Under contract with the G. & W. Manufacturing Company, of New York, N. Y., dated March 29, 1909, and supplemental agreement dated December 29, 1909, for the construction of a highway bridge across Core Creek, the following work was done during the year:

	Unit price.
Excavation (676 cubic yards)	$0.65
Embankment (3,680 cubic yards)	.37 .96
Piling (628 linear feet)	.35
Concrete (364 cubic yards)	9.80
Timber, laid (9,600 feet b. m.)	[a] 60.00
Steel and iron, erected (80,000 pounds); steel and iron, delivered (41,779 pounds)	.06¼

Two-thirds of price to be paid upon delivery at bridge site; one-third when erected.

The cost of the year's work was as follows:

Contractor's earnings	$15,680.61
Contractor's earnings (extras)	251.31
Superintendence and surveys	1,260.94
Main-office expenses	319.64
	17,512.50

Total cost to date, $18,007.40.

The bridge is about 85 per cent completed.

SUMMARY.

Right of way	$3,645.48
Dredging 3,452,239 cubic yards, at 10.8 cents	371,391.40
Core Creek bridge	18,007.40
Total cost to date	393,044.28

APPROPRIATIONS.

March 2, 1907	$200,000
May 27, 1908	170,000
March 4, 1909	135,000
June 25, 1910	10,000
Aggregate	515,000

CONTRACTS IN FORCE.

Contractor: Maryland Dredging and Contracting Company, Baltimore, Md.
Date of contract: August 15, 1908.
Date of approval: September 10, 1908.
Date of commencement: October 29, 1908.
Date of completion: March 14, 1910. Time limit waived.
For constructing Divisions A and B of inland waterway from Pamlico Sound to Beaufort Inlet. North Carolina, by the removal of approximately 3,600,000 cubic yards of material, at 10¾ cents per cubic yard.

Contractor: G. & W. Manufacturing Company, 26 Cortlandt street, New York.
Date of contract: March 29, 1909, and supplemental agreement, December 29, 1909.
Date of approval: April 16, 1909.
Date of commencement: May 19, 1909.
Date of completion: November 19, 1909. Time limit waived.
For constructing highway bridge over Core Creek, North Carolina.

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[a] Per thousand.

M 13.

IMPROVEMENT OF WATERWAY BETWEEN NEWBERN AND BEAUFORT, NORTH CAROLINA.

Reference.—See page 342 of current summary.

There was no work done during the year, no money being available.

This waterway is not worthy of further improvement, as after the inland waterway from Pamlico Sound to Beaufort Inlet is completed, the present route via Clubfoot and Harlowe Canal will not be required.

APPROPRIATIONS.

Prior to 1884 (see H. Doc. No. 421, 57th Cong., 2d sess.)	$10,000
August 5, 1886	10,000
August 11, 1888	15,000
March 2, 1907	2,000
Total	37,000

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered:		
Steamers[a]	30	180
Sailing	125	1,500
Total	155	1,680

[a] These are gasoline boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Cement	15 tons	15	$150	6	(a)
Clams	150 bushels	8	160	20	$0.05
Coal	7,400 tons	7,400	37,000	6	(a)
Cotton	760 bales	190	45,600	17	.113
Cotton seed	10,550 bushels	211	4,220	16	.05
Eggs	60 crates	1	400	20	.45
Fertilizers	2,150 tons	2,150	64,500	20	.063
General merchandise	50 tons	50	7,000	7	(a)
Lime	30 tons	30	300	6	(a)
Lumber	1,080,000 feet b. m	2,160	21,600	4	(a)
Machinery	115 tons	115	11,500	6	(a)
Potatoes	1,150 bushels	35	700	7	.162
Rosin	3,300 barrels	528	13,200	20	.047
Stone	160 tons	160	320	6	(a)
Tar	1,500 barrels	225	3,375	4	.416
Turpentine, spirits	325 barrels	73	3,650	20	.033
Total		13,351	213,675		

[a] Impracticable to give rates. Tonnage carried principally by owners.

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
DOWNSTREAM.					
Brick	56,000	140	$420	20	$0.03
Coal	60 tons	60	300	20	[a]
Cotton	125 bales	31	7,440	6	.166
Cotton seed	3,750 bushels	75	1,500	6	.106
Cotton-seed meal	230 tons	230	5,750	14	.071
Clams	2,000 bushels	100	2,000	6	[a]
Fertilizers	240 tons	240	4,800	12	.093
Fish	2,200 boxes	110	8,800	20	[a]
General merchandise	4,655 tons	4,655	651,700	11	.18
Grain	9,216 bushels	184	6,440	17	.113
Hay	2,540 bales	127	2,540	13	.077
Lumber	200,000 feet b. m	400	4,000	7	[a]
Machinery	30 tons	30	3,000	20	.10
Oysters	35,000 bushels	1,750	35,000	7	[a]
Timber	1,080,000 feet b. m	3,240	12,960	4	Rafted.
Wood	1,000 cords	1,000	4,000	6	.166
Total		12,372	750,650		
RECAPITULATION.					
Total upstream		13,351	213,675		
Total downstream		12,372	750,650		
Total		25,723	964,325		

[a] Impracticable to give rates. Tonnage carried principally by owners.

M 14.

IMPROVEMENT OF HARBOR AT BEAUFORT, NORTH CAROLINA.

Reference.—See page 343, current summary.

Work on sand fences at Fort Macon and Shackleford points was carried on from August 9 to August 17, 1909, and during June, 1910, the following having been accomplished:

At Fort Macon Point.—Three hundred and four feet of sand fences were built; 519 feet of sand fences were filled under; 278 feet of sand fences were raised; 89 feet of sand fences were repaired; 19 sand bags were filled and placed.

At Shackleford Point.—Two hundred and ninety feet of sand fences were built; 1,175 feet of sand fences were filled under; 406 feet of sand fences were raised; 273 feet of sand fences were repaired; 405 sand bags were filled and placed.

The cost of this work was $1,203.56, all of which was for maintenance.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Prior to 1896 (see H. Doc. No. 421, 57th Cong., 2d sess.)	$155,000
June 3, 1896	5,000
June 13, 1902	3,000
Allotted from appropriation for emergencies in river and harbor works, act of April 28, 1904	1,000
March 3, 1905	2,000
March 2, 1907	22,000
June 25, 1910	32,676
Total	220,676
Received from sales, etc	725

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers[a]	45	300	5,000
Sailing	150	3,700	
Total	195	4,000	5,000

[a] These are gasoline boats.

There are from 75 to 100 steamers and yachts that come in for a harbor during the year.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Brick	376,000	940	$2,820
Cattle	50 head	13	780
Coal	7,784 tons	7,784	38,920
Cotton	610 bales	153	36,720
Cotton seed	9,000 bushels	180	3,600
Cotton-seed meal	156 tons	156	3,900
Clams	19,600 bushels	980	19,600
Eggs	125 crates	3	1,200
Fertilizers	2,375 tons	2,375	68,250
Fish	30,800 boxes	1,540	123,200
General merchandise	4,056 tons	4,056	567,840
Grain	7,500 bushels	186	6,510
Hay	900 bales	45	900
Hogs	150 head	5	500
Horses	100 head	50	10,000
Lumber	4,800,000 feet b. m	9,600	96,000
Machinery	160 tons	160	16,000
Oysters	102,400 bushels	5,120	102,400
Poultry	6,000 head	12	2,400
Peanuts	330 bushels	5	300
Potatoes	5,800 bushels	174	3,480
Rosin	3,300 barrels	528	13,200
Shingles	150,000	75	600
Turpentine, spirits	325 barrels	73	3,650
Timber	1,000,000 feet b. m	3,000	12,000
Vegetables	400 tons	400	8,000
Wood	1,775 cords	1,775	7,100
Ice	960 tons	960	9,600
Soft crabs	16,000 dozen	48	24,000
Fish (for fertilizers)	12,000 tons	12,000	240,000
Total		52,396	1,423,470

Few freight rates exist for transporting over this harbor, most of the tonnage being carried in small schooners and barges irregularly in cargo lots. It is impracticable, for the same reason, to estimate the average length of trip.

M 15.

IMPROVEMENT OF BEAUFORT INLET, NORTH CAROLINA.

Reference.—See page 345, current summary.

A survey of the bar was made in March, 1910, preparatory to resuming the work of dredging by government plant. The suction dredge *Cape Fear* started dredging on the ocean bar May 11, 1910, and up to the close of the fiscal year removed 51,997 cubic yards of material. The work resulted in an increase in the minimum depth on the bar of 1 foot.

The cost of the work was as follows:

Pay roll, dredge *Cape Fear*, etc	$1,885.83
Coal	1,518.64
Water	97.13
Supplies, subsistence	461.69
Supplies, engine room	257.91
Other supplies	95.76
Property	132.88
Ordinary repairs	33.72
Miscellaneous	165.30
Total	4,648.86
Extraordinary repairs	1,981.87
	6,630.73

Cost of survey, $1,379.93.

The cost of the dredging, exclusive of extraordinary repairs, was 8.9 cents per cubic yard. The cost, including the repairs, was 12.8— cents per cubic yard, and the total cost, including superintendence and surveys, was 15.4+ cents per cubic yard.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 3, 1905	$45,000
March 2, 1907	5,000
March 3, 1909 (allotment)	15,000
June 25, 1910	7,500
Total	72,500

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered sailing	40	650

Seventy-five to 100 steamers and yachts go in the inlet during the year for a harbor.

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
OUTBOUND.			
Lumber	4,000,000 feet b. m.	8,000	$80,000
INBOUND.			
Fish	16,091 boxes	805	64,400
Fish (for fertilizer)	12,000 tons	12,000	240,000
Total		20,805	384,400

Fish transported by owners in small boats. Lumber shipped by cargo to northern points.

M 16.

IMPROVING HARBOR AT MOREHEAD CITY, NORTH CAROLINA.

Reference.—See page 346 of current summary.

No work was done during the year.

This work is worthy of maintenance, but of no further improvement than contemplated in present project.

APPROPRIATIONS.

June 25, 1910	$19,000

M 17.

NEW RIVER, INCLUDING INLAND WATERWAYS BETWEEN BEAUFORT HARBOR AND NEW RIVER AND BETWEEN NEW RIVER AND SWANSBORO, NORTH CAROLINA.

(A) NEW RIVER.

Reference.—See page 346 of current summary.

No work, except that of making a survey in December, 1909, and January, 1910, was done. Other expenditures were for repairs to plant, collecting commercial statistics, and for inspection of the work by the officer in charge.

On May 4, 1910, all available funds were transferred to the allotments for waterway between New River and Swansboro, where work was more badly needed than on New River.

The expenditures for the year amounted to $627.16, all for maintenance, and were as follows:

Surveying	$425.78
Collecting commercial statistics	69.87
Repairs to dredge *Scuppernong*	81.51
Towing dredge *Scuppernong*	50.00
	627.16

APPROPRIATIONS.

Date.	Amount.	Aggregate.
July 4, 1836, to July 7, 1838		$50,000.00
August 2, 1882	$5,000.00	5,000.00
July 4, 1884	5,000.00	10,000.00
August 5, 1886	10,000.00	20,000.00
August 11, 1888	3,000.00	23,000.00
September 19, 1890	5,000.00	28,000.00
July 13, 1892	5,000.00	33,000.00
March 2, 1907	669.20	[b] 33,669.20
June 25, 1910	[a] 6,700.00	40,369.20

[a] Allotted from combined appropriation.

[b] Reduced by $1,330.80, transferred to waterway between New River and Swansboro, N. C.

Note.—Received from sales, etc., $0.10.

COMMERCIAL STATISTICS.

Vessel classfication.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers[a]	10	88	200
Sailing	10	100	
Total	20	188	200

[a] This includes gasoline boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Cotton	488 bales	122	$29,280	22	$0.091
Cotton seed	115 tons	115	2,300	22	.08
Clams	3,880 bushels	194	3,880	22	.091
Eggs	50 crates	1	400	22	.23
Fish	7,560 boxes	378	30,240	22	.272
General merchandise	50 tons	50	7,000	22	.091
Hay	100 bales	5	100	22	.136
Lumber	1,500,000 feet b. m.	3,000	30,000	22	.04
Oysters	62,500 bushels	3,125	62,500	22	Cargo.
Peanuts	990 bushels	15	900	22	.151
Timber	11,625,000 feet b. m.	34,875	139,500	22	Cargo
Total		41,880	306,100		
DOWNSTREAM.					
Brick	3,500	9	27	22	.055
Cotton-seed meal	5 tons	5	125	22	.091
Clams	700 bushels	35	700	2	Cargo.
Fertilizers	105 tons	105	3,150	22	.091
Fish	1,700 boxes	85	6,800	22	Cargo.
General merchandise	343 tons	343	48,020	22	.091
Grain	3,630 bushels	90	3,150	22	.091
Lumber	24,000 feet b. m.	48	480	22	.04
Peanuts	66 bushels	1	60	22	.151
Rosin	1,246 barrels	199	4,975	13	.12
Timber	500,000 feet b. m.	1,500	6,000	22	Cargo.
Wood	20 cords	20	80	22	.07
Total		2,440	73,567		
RECAPITULATION.					
Total upstream		41,880	306,100		
Total downstream		2,440	73,567		
Total		44,320	379,667		

(B) INLAND WATERWAYS BETWEEN NEW RIVER AND SWANSBORO.

Reference.—See page 348 of current summary.

The U. S. dredge *Scuppernong*, operated by hired labor, began work on this waterway March 4, 1910. The amount of material removed up to the end of the fiscal year was as follows: Eight thousand eight hundred and eighty-four cubic yards from a cut 2,340 feet long, 3 to 4 feet deep, and 40 feet wide in the vicinity of Standback shoal; and 13,450 cubic yards from a cut 3,790 feet long, 3 to 4 feet deep, and 40 feet wide at Sand shoal. On May 4, 1910, the sum of $1,330.80 was transferred to the allotment for this work from the allotment for New River, which was spent in removing 9,154 cubic yards of material from a cut 2,955 feet long, 40 feet wide, and 3 to 4 feet deep near Craigs Point. Total amount of dredging, 31,488 cubic yards. The dredge was withdrawn from the work May 26, all funds having been exhausted.

The cost of this work was as follows:

Operating dredge and plant	$3, 228. 68
Special repairs to dredge	814. 95
Towing plant to and from work	368. 17
Newbern yard, rent and watching	252. 40
Local superintendence and surveys	519. 21
Wilmington office expenses	147. 39
Total	5, 330. 80

making the cost 16.9+ cents per cubic yard. Superintendence expenses were exceptionally heavy on account of the exhaustion of funds on other works under the same local office, making this work carry all the burden.

The project depth now exists throughout the entire waterway. There are, however, a few places where the project width has not been secured. The project is about 95 per cent completed.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]5, 000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

September 19, 1890	$5, 000. 00
March 2, 1907	[b]12, 000. 00
Transferred from Beaufort Harbor-New River	3, 500. 00
March 3, 1909 (allotted)	[c]5, 330. 80
Total	25, 830. 80

NOTE.—Rents, sales, etc., $1,125.

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Allotted from combined appropriation.

[c] Increased by $1,330.80, transferred from New River.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered:		
Steamers[a]	6	36
Sailing	20	200
Total	26	236

[a] These are gasoline boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM (GOING WEST).					
Brick	6,000	15.00	$45.00	4.0	$0.10
Coal	10 tons	10.00	50.00	4.0	.25
Cotton-seed meal	46 tons	46.00	1,150.00	4.0	.1875
Fertilizers	150 tons	150.00	4,500.00	4.0	.25
General merchandise	250 tons	250.00	35,000.00	4.0	.375
Grain	6,100 bushels	152.5	5,337.50	4.0	.30
Hay	30 tons	30.00	600.00	4.0	.25
Machinery	10 tons	10.00	1,000.00	4.0	.50
Total		663.5	47,682.50		
DOWNSTREAM (GOING EAST).					
Cotton	360 bales	90.00	21,600.00	4.0	.25
Cotton seed	105 tons	105.00	2,100.00	4.0	.1875
Clams	5,700 bushels	285.00	5,700.00	13.5	Cargo.
Eggs	40 crates	.8	320.00	4.0	1.25
Fish	10,670 barrels	618.5	49,480.00	22.0	Cargo.
Rosin	3,300 barrels	528.00	13,200.00	4.0	.1565
Turpentine, spirits	325 barrels	48.75	2,437.50	4.0	.1667
Timber	750,000 feet b. m.	2,250.00	9,000.00	12.5	Rafted.
Total		3,926.05	103,837.50		
RECAPITULATION.					
Total upstream		663.5	47,682.50		
Total downstream		3,926.05	103,837.50		
Total		4,589.55	151,520.00		

(c) WATERWAY BETWEEN BEAUFORT HARBOR AND NEW RIVER—I. E., PORTION BETWEEN BEAUFORT AND SWANSBORO.

Reference.—See page 350 of current summary.

The U. S. dredge *Scuppernong* started dredging on this waterway on January 27, 1910, and up to February 28, when work was stopped on account of exhaustion of funds, had removed 5,444 cubic yards of hard sand and mud at Cross Stakes Slough, near Swansboro.

The cost of this work was as follows:

Operating plant	$962.77
Special repairs to dredge	150.42
Towing plant to and from work	182.16
Newbern yard, rent and watching	56.75
Superintendence	315.34
Total	1,667.44

making the cost 30.6+ cents per cubic yard.

APPROPRIATIONS.

Date.	Amount.	Aggregate.
August 5, 1886	$10,000	$10,000
August 11, 1888	5,000	15,000
September 19, 1890	15,000	30,000
July 13, 1892	10,000	40,000
August 18, 1894	2,500	42,500
June 3, 1896	1,000	43,500
June 13, 1902	9,500	53,000
March 2, 1907	[a] 3,000	56,000
Transferred to New River-Swansboro portion	3,500	52,500
March 3, 1909	1,000	53,500
June 25, 1910	[a] 12,000	65,500

[a] Allotted from combined appropriation.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered:		
Steamers[a]	26	252
Sailing	75	520
Total	101	772

[a] This includes gasoline boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Brick	26,000	65	$195	27	$0.044
Coal	15 tons	15	75	27	.074
Cottonseed meal	80 tons	80	2,000	24	.068
Fertilizer	175 tons	175	5,250	23	.087
General merchandise	735 tons	735	102,900	26	.072
Grain	700 bushels	18	630	27	.074
Hay	400 bales	20	400	27	.074
Timber	200,000 feet	600	2,400	3	Rafted.
Total		1,708	113,850		

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
DOWNSTREAM.					
Cattle	25 head	6	360	20	.05
Cotton	640 bales	160	38,400	24	.131
Cottonseed	16,500 bushels	330	6,600	22	.047
Clams	30,165 bushels	1,508	30,160	24	.069
Cross-ties	10,000	625	4,375	27	Cargo.
Eggs	40 crates	1	400	20	.25
Fish	34,400 boxes	1,720	137,600	24	Cargo.
Hogs	60 head	2	200	20	.413
Lumber	5,700,000 feet b. m	11,400	114,000	25	Cargo.
Poultry	1,500 head	3	600	20	.208
Potatoes	750 bushels	23	460	20	.25
Rosin	3,300 barrels	528	13,200	27	.069
Soft-shell crabs	30,000 dozen	60	30,000	15	Cargo.
Timber	2,400,000 feet b. m	7,200	28,800	24	Rafted.
Turpentine, spirits	325 barrels	73	3,650	27	.066
Total		23,639	408,805		
RECAPITULATION.					
Total upstream		1,708	113,850		
Total downstream		23,639	408,805		
Total		25,347	522,655		

NOTE.—In the column "Rate per ton-mile" where the word "cargo" is inserted it means that these were shipments made by owners in their boats, rafts, etc., and it was therefore not practicable to get the rate.

M 18.

IMPROVEMENT OF NORTHEAST (CAPE FEAR) AND BLACK RIVERS AND CAPE FEAR RIVER ABOVE WILMINGTON, NORTH CAROLINA.

(A) NORTHEAST RIVER, NORTH CAROLINA.

Reference.—See page 351 of current summary.

The work during the fiscal year 1910 consisted of snagging operations between the thirty-eigth mile board and Smiths Bridge, 52 miles above Wilmington, from February 12 to March 26, 1910. The following obstructions were removed: One hundred and fifty-two large snags, 1 stump, 24 logs, 13 raft logs, 20 trees, from the channel, and 1,009 trees hauled back from banks, 1 tree trimmed, and 6 cords of brush removed.

Between the forty-fifth and forty-eighth mile boards obstructions were removed from the banks only, the water being too high for snagging the channel. There is no work needed below the thirty-eighth mile board. The river is now in good condition below the fifty-second mile board, excepting channel between the forty-fifth and forty-eighth mile boards. The cost of this work was $926.12, all for operating hoister.

The new hull for the snag boat *General H. G. Wright*, under construction at the beginning of the year, has been completed, and the house built and machinery installed. The portion of the cost charged to this improvement was $2,323.52.

Other expenses in connection with this work are as follows: Inspection, $12.83; collecting commercial statistics, $59.38; and Wilmington office expenses, $124.07, making the total cost of the year's work $3,445.92.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

September 19, 1890, for Northeast (Cape Fear) River, North Carolina	$5,000
July 13, 1892, for Northeast (Cape Fear) River, North Carolina	5,000
August 18, 1894, for Northeast (Cape Fear) River, North Carolina	5,000
March 3, 1899, for Northeast River, North Carolina	2,000
June 13, 1902, for Northeast River, North Carolina	[b]2,000
Allotted from emergency appropriation June 13, 1902	500
March 3, 1905	[b]2,000
March 2, 1907	[b]2,000
March 3, 1909 (allotment)	6,000
June 25, 1910 (allotment)	[b]2,000
Total	31,500

NOTE.—Received from rents, sales, etc., $243.33.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	1	59	1,278
Tugs	11	228	....
Unregistered:			
Flats	40	2,000	....
Rafts	80	....	....
Total	132	2,287	1,278

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Allotted from joint appropriation for Northeast and Black rivers, North Carolina, and Cape Fear River, North Carolina, above Wilmington.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Brick	281,500	704	$2,112	60	$0.016
Cottonseed meal	211 tons	211	5,275	60	.03
Fertilizer	2,747 tons	2,747	82,410	65	.03
Fertilizer materials	26,191 tons	26,191	523,820	3	Cargo.
General merchandise	1,985 tons	1,985	277,900	60	.10
Grain	11,480 bushels	287	10,045	60	.033
Hay	5,520 bales	276	5,520	60	.033
Lumber	1,000,000 feet b. m.	2,000	20,000	45	.0225
Machinery	452 tons	452	45,200	45	.033
Fish	140 barrels	7	560	60	.05
Coal	1,358 tons	1,358	4,753	3	Cargo.
Total		36,218	977,595		
DOWNSTREAM.					
Cotton	2,200 bales	550	132,000	60	.05
Cotton seed	19,550 bushels	391	7,820	60	.033
Eggs	2,212 crates	44	17,600	60	.21
Hogs	900	270	27,000	60	.033
Lumber	9,581,000 feet b. m.	19,162	191,620	45	.025
Poultry	11,160	22	4,400	60	.17
Peanuts	31,120 bushels	467	28,020	60	.04
Potatoes	1,400 bushels	42	840	60	.033
Rosin	5,000 barrels	800	20,000	60	.02
Shingles	5,995,000	2,998	23,986	40	.033
Turpentine:					
Crude	2,397 barrels	360	11,800	60	.02
Spirits	985 casks	222	33,300	60	.06
Tar	1,532 barrels	268	4,020	60	.025
Timber, square and round	19,999,000 feet b. m.	59,589	238,356	45	Rafted.
Wood	4,032 cords	4,032	16,128	35	Flatted.
Cross-ties	15,000	750	3,150	55	[a]
Poles and piles	3,030	758	3,790	50	Rafted.
Cattle	173 head	43	2,580	60	.10
Total		90,768	766,410		
RECAPITULATION.					
Total upstream		36,218	977,595		
Total downstream		90,768	766,410		
Total		126,986	1,744,005		

[a] Rafted and flatted.

Passengers transported, 1,278; revenue therefrom, $297; transportation lines established during the year, 1.

All of the fertilizer materials and coal passed over only the lower 3 miles of the river. Practically all of the down freight, excepting timber and its products, is received from points between the forty-ninth and seventy-ninth mile boards and transported to Wilmington, and the upstream freight is received at Wilmington and transported to the same points. Practically all of the timber and its products come to Wilmington from points between the twenty-seventh and sixtieth mile boards.

(B) IMPROVING BLACK RIVER, NORTH CAROLINA.

Reference.—See current summary, page 353.

The work during the year consisted of snagging operations in July, 1909, by snag boat *General H. G. Wright*. There were removed from the channel 62 large snags, 3 stumps, 16 logs, 47 trees; and from the banks 176 trees hauled back, 4 trees trimmed, and 3 cords of brush cut.

The cost of this work was $451.52, all of which was for operating the snag boat *Wright.*

The construction of a small shallow-draft hoister was started in March and completed in June. She was fitted out and left here for work on this stream on June 29, but no actual work of snagging had been done with this hoister up to June 30.

The cost of this hoister, fitting her up for snagging, and supplies put aboard was as follows:

Cost of hoister complete	$1,280.82
Fitting up hoister	87.00
Property, rope, etc	95.96
Subsistence supplies	73.19
Other supplies	16.98
Total	1,553.95

The new hull for the snag boat *Wright*, which was under construction at the beginning of the year, has been completed and house placed on same and machinery transferred, and this boat is now practically ready for work. The portion of the cost of this work charged to this improvement was $353.51.

Other expenses incurred during the year were for collecting commercial statistics, $55.32, and main office expenses, $133.85, making the total cost of the year's work $2,548.15, all of which was for maintenance.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement [a]$1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Date.	Amount.	Aggregate.
Prior to 1894 (see H. Doc. 421, 57th Cong., 2d sess.)		$13,000
August 17, 1894	$2,000	15,000
June 3, 1896	1,000	16,000
March 3, 1899	2,000	18,000
June 13, 1902	[b]2,000	20,000
Allotted from emergency appropriation, June 13, 1902	500	20,500
March 3, 1905	[b]2,000	22,500
March 2, 1907	[b]2,000	24,500
March 3, 1909 (allotted)	4,000	28,500
June 25, 1910 (allotted)	[b]2,000	30,500

NOTE.—Rents, sales, etc., $243.34.

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Allotted from joint appropriation for Northeast and Black rivers, North Carolina, and Cape Fear River, North Carolina, above Wilmington.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	1	36	1,963
Tugs	9	108	
Unregistered:			
Flats	35	1,750	
Rafts	50		
Total	95	1,894	1,963

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Brick	24,300	61	$183	57	$0.015
Cotton-seed meal	87 tons	87	2,175	57	.035
Fish	630 barrels	32	2,560	57	.05
General merchandise	3,540 tons	3,540	495,600	57	.09
Grain	8,500 bushels	213	7,455	57	.035
Hay	3,180 bales	159	3,180	57	.035
Machinery	24 tons	24	2,400	50	.04
Rice, rough	500 bushels	12	600	35	.03
Fertilizer	1,548 tons	1,548	46,440	57	.035
Total		5,676	560,593		
DOWNSTREAM.					
Cattle	156 head	39	2,340	57	.09
Cotton	440 bales	110	26,400	57	.035
Cotton seed	7,250 bushels	145	2,900	57	.035
Eggs	1,460 crates	29	11,600	57	.22
Hogs	1,035 head	31	3,100	57	.06
Lumber	3,251,000 feet b. m.	6,502	65,020	50	.02
Poultry	7,900 head	16	3,200	57	.09
Peanuts	4,744 bushels	71	4,260	57	.06
Potatoes	2,350 bushels	72	1,440	57	.035
Rosin	13,900 barrels	2,224	55,600	57	.02
Shingles	3,697,000	1,849	14,792	50	.02
Turpentine:					
Crude	5,150 barrels	772	23,160	57	.02
Spirits	2,046 casks	460	69,000	57	.04
Tar	2,910 barrels	509	7,635	57	.02
Timber	6,410,500 feet b. m.	19,582	78,328	50	Rafted.
Vegetables	1,406 bushels	35	700	57	.035
Wood	5,206 cords	5,206	20,824	40	.03
Cross-ties	36,902	2,306	16,142	50	Flatted.
Piles and poles	9,675	2,419	12,095	50	Rafted.
Deer tongue	8 tons	8	480	57	.035
Total		42,385	419,016		
RECAPITULATION.					
Total upstream		5,676	560,593		
Total downstream		42,385	419,016		
Total		48,061	979,609		

Transportation lines established during the year, none.

There is very little freight received from or carried to points below Point Caswell, 36 miles above Wilmington. All of this freight passes over 12 miles of Cape Fear River, above Wilmington, but it is not included in the commerce for that stream.

(c) CAPE FEAR RIVER ABOVE WILMINGTON, N. C.

References.—See page 354 of current summary.

The only work during the year consisted of repairing jetty at Walkers Bluff and removing sunken scow at the seventy-eighth mile board in July and August, 1909. Other expenditures were for examinations of the river from Fayetteville to Wilmington, in September, 1909, and February, 1910, and examination of dam of power plant at Buckhorn Falls, reported as obstructing navigation.

The cost of this work was $606.18, all for maintenance, and distributed as follows:

Repairing jetty at Walkers Bluff	$156.18
Removing sunken scow at seventy-eighth milepost	96.23
Collecting commercial statistics	60.94
Superintendence and inspections	292.83
Total	606.18

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $1,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Date.	Amount.	Aggregate.	Date.	Amount.	Aggregate.
March 3, 1881	$30,000.00	$30,000.00	June 3, 1896	$5,000.00	$137,250.00
August 2, 1882	30,000.00	60,000.00	March 3, 1899	5,000.00	142,250.00
July 5, 1884	5,000.00	65,000.00	June 13, 1902	[a] 50,000.00	192,250.00
August 5, 1886	11,250.00	76,250.00	Do	[b] 6,000.00	198,250.00
August 11, 1888	12,000.00	88,250.00	March 3, 1905	[b] 5,000.00	203,250.00
September 19, 1890	15,000.00	103,250.00	March 2, 1907	[b] 5,000.00	208,250.00
July 13, 1892	15,000.00	118,250.00	June 25, 1910	[b] 3,000.00	211,250.00
August 18, 1894	14,000.00	132,250.00			

[a] $35,317.77 withdrawn and turned into surplus fund, in accordance with section 10 of sundry civil act of March 4, 1909. The total of appropriations should be reduced by $14,682.23, the amount expended under this appropriation, which is accounted for in the following appendix, M 19, "Locks and dams."

[b] Allotted from joint appropriations for Northeast and Black rivers, North Carolina, and Cape Fear River, North Carolina, above Wilmington.

NOTE.—Rents, sales, etc., $414.33.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	3	208	5,000
Tugs	10	197	....
Unregistered:			
Flats	40	2,000	....
Rafts	130	....	....
Total	183	2,405	5,000

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
UPSTREAM.					
Brick	386,000	964	$2,892	30	Flatted.
Cotton-seed meal	253 tons	253	6,325	90	$0.018
Fertilizers	14,205 tons	14,205	426,150	100	.017
Fertilizer material	49,775 tons	49,775	995,500	4	Cargo.
Fish	220 barrels	11	880	100	.03
General merchandise	12,150 tons	12,150	1,701,000	100	.04
Grain	7,675 bushels	192	9,725	100	.02
Machinery	90 tons	90	9,000	90	.033
Hay	3,980 bales	199	3,980	100	.02
Total		77,839	3,155,452		
DOWNSTREAM.					
Brick	850,000	2,125	6,375	30	Flatted.
Cotton	10,053 bales	2,513	603,120	100	.03
Cotton seed	75,000 bushels	1,500	30,000	100	.017
Cattle	175 head	44	2,640	90	.044
Eggs	924 crates	18	7,200	90	.014
Hogs	897 head	24	2,400	90	.033
Horses	55 head	27	5,400	90	.055
Lumber	11,000,000 feet b. m.	22,000	220.000	80	.016
Poultry	6,960 head	14	2,800	90	.111
Peanuts	666 bushels	10	600	90	.037
Potatoes	976 bushels	29	580	90	.02
Rosin	11,943 barrels	1,911	47,775	80	.016
Shingles	1,700,000	850	6,800	80	.016
Turpentine:					
Crude	3,340 barrels	501	15,030	80	.017
Spirits	1,820 barrels	430	63,500	80	.028
Tar	7,172 barrels	1,076	16,140	80	.017
Wood	6,230 cords	6,230	24,920	60	Flatted.
Piles and poles	12,577	3,125	15,625	70	Rafted.
Cross-ties	230,106	13,381	93,667	70	Rafted and flatted.
Timber, square, round, and gum logs.	11,072,000 feet b. m.	35,088	140,352	70	Rafted.
Total		90,896	1,304,924		
RECAPITULATION.					
Total upstream		77,839	3,155,452		
Total downstream		90.896	1,304,924		
Total		168,735	4,460,376		

Transportation lines established during the year, none.

About 75 per cent of the upstream freight, except fertilizer materials, is carried through from Wilmington to Fayetteville, and but a small portion of the balance is left at points below the fiftieth milepost. The fertilizer materials pass over only the lower 4 miles. Of the downstream freight, 75 per cent of the cotton is taken on at Fayetteville and carried to Wilmington. Practically all other downstream freight, except timber and its products, are taken on between Fayetteville and the fiftieth milepost and brought to Wilmington. Timber and its products are rafted down to Wilmington from points above and below Fayetteville.

M 19.

IMPROVEMENT OF CAPE FEAR RIVER ABOVE WILMINGTON, NORTH CAROLINA (LOCKS AND DAMS).

Previous operations under the project of June 13, 1902, were in making surveys for the selection of sites for locks and dams, preparation of abstracts of title, and purchase of site for the lower lock and dam.

A new project was adopted by the river and harbor act of June 25, 1910, for the construction of two locks and dams with a view to securing 8 feet depth up to Fayetteville. There were no operations under the new project to the close of the fiscal year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $200,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

June 13, 1902	[b] $50,000
June 25, 1910	100,000

M 20.

IMPROVEMENT OF CAPE FEAR RIVER, NORTH CAROLINA, AT AND BELOW WILMINGTON.

Reference.—See page 356 of current summary.

The operations of the year have been the work of the suction dredges *Cape Fear* and *Comstock*, the clam-shell dredges *Ajax* and *Hercules*, and the hydraulic dredge *Jacksonville*, on the ocean bar, river channels, and the mooring basin at Wilmington; also making repairs to Swash defense dam, beginning the construction of a yard on a piece of property purchased during the year for that purpose, making minor surveys, and repairing plant.

The dredge *Jacksonville*, from the Jacksonville, Fla., district, worked on this improvement the entire year, for which this improvement pays rental at the rate of $41 per calendar day, or $14,965 for the year. At the beginning of the year there was still due Cape Fear River improvement $1,030.14 for repairs made to the dredge and paid for by this improvement before the dredge left Jacksonville. Since the dredge left Jacksonville repairs have been made to the dredge amounting to $5,397.84, for which this improvement has received credit on the rent, leaving the balance of the rental paid that district for the year $8,537.02.

The dredge *Gen. C. B. Comstock* which was rented from the Galveston, Tex., district, at $45 per working day, began preparing to leave Galveston on May 26, left there on June 2, arrived on Cape Fear River on the 11th, and started work on June 16.

The disbursements of the year were $227,791.34, of which $17,076.36 was for outstanding liabilities of last year, leaving $210,714.98 pertaining to the present fiscal year. Adding to this the present outstanding liabilities, $22,371.40, the sum of $233,086.38 represents the liabilities incurred during the fiscal year. From this amount should be deducted $376.99 received from sales of old property, etc., and $1,030.14 due by the Jacksonville office at the beginning of the year should be added, giving $233,739.53 as the actual cost of the year's work, for which the following work has been accomplished:

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Withdrawn and turned into the surplus fund, in accordance with section 10 of the sundry civil act of March 4, 1909, $35,317.77.

268,626 cubic yards of sand and mud removed by the dredge *Cape Fear*, at 7.8+ cents, made up as follows:		
Field cost of operating dredge	$17,719.56	
All other expenses chargeable to this work	3,290.00	
		$21,009.56
1,014,003 cubic yards of sand and mud removed by the dredge *Jacksonville*, at 7.7− cents, made up as follows:		
Field cost of operating dredge	$52,732.63	
Rent of dredge, 365 days, at $41	14,965.00	
All other expenses chargeable to this work	10,375.00	
		78,072.63
899,504 cubic yards of sand and mud removed by the dredge *Hercules*, at 5− cents (including cost of removing 347 stumps and 192 logs), made up as follows:		
Field cost of operating dredge and plant	$38,046.84	
All other expenses chargeable to this work	6,605.00	
		44,651.84
587,411 cubic yards of sand and mud removed by dredge *Ajax*, at 4.5+ cents (includes cost of removing 231 stumps and 84 logs), made up as follows:		
Field cost of operating dredge and plant	$21,695.45	
All other expenses chargeable to this work	4,880.00	
		26,575.45
49,172 cubic yards of sand and mud removed by the dredge *Gen. C. B. Comstock*, at 17.4+ cents, made up as follows:		
Field cost of operating dredge	$2,272.22	
Making trip from Galveston and getting ready for work	2,497.05	
Repairs made and duplicate parts put aboard before leaving Galveston	1,849.03	
Rent of dredge, 25 days, at $45	1,125.00	
All other expenses chargeable to this work	830.00	
		8,573.30
Repairs to Swash Defense dam, made up as follows:		
621.25 tons of riprap stone placed on dam, at $3.03+ per ton	$1,884.60	
Concreting apron, patching top and slopes	25,036.84	
Coping top, apron, and slopes	4,756.75	
Picking up stone and placing along river toe	2,390.54	
		34,068.73
Repairs to New Inlet dam, picking up stone and placing along river toe		744.12
The following items have not been charged into the cost of the work, but have been added to the value of plant, and allowed for in the 10 per cent deterioration:		
Special repairs to dredge *Cape Fear*	$6,924.79	
Special repairs to dredge *Ajax*	6,750.32	
Special repairs to scow "*C*"	935.58	
Purchasing property for a repair yard and building bulkhead for wharf	5,433.21	
		20,043.90
Total cost of year's work		233,739.53

The dredge *Jacksonville* also rehandled 19,977 cubic yards of material for the dredge *Cape Fear* and 39,952 cubic yards for the dredge

Hercules, the cost of which is included in the cost of the *Jacksonville's* dredging, as the amount was so small the cost of rehandling was inappreciable.

The coping of Swash Defense dam in progress at the beginning of the year was finished. The whole of the apron on the river side was capped with a layer of concrete 6 to 8 inches thick, and the river slope with a layer of concrete 4 to 6 inches thick. The top and bay slope was patched with a layer 4 to 6 inches thick where necessary. A hoister was engaged for about four months in picking up large stone near the dam and placing it along the river toe. This dam is now completed, but it may later be found necessary to place a few more large stones in places along the river toe.

A hoister was engaged for nearly two months in picking up large stone along New Inlet dam, torn out by storms, and placing them back on the dam.

The following is a statement of the amount of dredging done during the year:

Where removed from.	Material (cubic yards).	Stumps.	Logs.
River channel, for improvement	2,106,444	575	29
River channel, for maintenance	431,440	....	....
Ocean bar, for maintenance	196,381	....	....
Mooring basin, Wilmington	84,451	3	247
Total	2,818,716	578	276

The cost of removing this 2,818,716 cubic yards of material, 578 stumps, and 276 logs, not including the cost of special repairs made to dredges and the cost of new yard, was $178,882.78, or 6.3+ cents per cubic yard, allowing nothing for the cost of removing logs and stumps. The estimated value of the dredging plant belonging to Cape Fear River improvement at the beginning of the year was $198,868.41, and during the year special repairs have been made and property purchased costing $19,108.32, making the present value of this plant about $217,976.73. Adding 10 per cent of this value, $21,797.67, to the cost of the year's dredging, for deterioration, we have the actual cost of the dredging, including deterioration of plant, 7.1+ cents per cubic yard, allowing nothing for the cost of logs and stumps.

The estimated value of the plant used in connection with the repairs to Swash Defense and New Inlet dams at the beginning of the year was $7,200, and during the year special repairs were made to this plant costing $935.58, making the present value about $8,135.58. Adding 10 per cent of this value, $813.56, to the cost of the year's work, we have the cost of repairs made to Swash Defense dam, including deterioration of plant, $34,864.79, and to New Inlet dam, $761.62.

As a result of the year's work a mooring basin in front of Wilmington 24 feet deep has been partially completed. Repairs to Swash Defense dam have been completed. The channels below Reaves Point shoal, including the ocean bar, which were 22 feet deep at the beginning of the year, and the 22 to 24 foot channels above Reaves Point shoal have been maintained, and in addition Wilmington, Brunswick River, Logs and Big Island, Keg Island, Lilliput, Old Brunswick Cove, and Midnight shoals have been increased to 270 feet width and 24 feet depth, and Alligator Creek shoal to 222 feet to 270 feet width and 24 feet depth, and Reaves Point shoal to 148 feet width and 24 feet depth.

A piece of property has been purchased at Wilmington for a repair yard, and a bulkhead 300 feet long in front of same has been about 70 per cent completed.

With the available balance it is proposed to complete the repairs to New Inlet dam and extension at Federal Point and Zekes Island ends, maintain present dredged channels, construct a pile training dike for regulating the currents in the vicinity of Snows Marsh channel, and continue the project in accordance with the provisions of the river and harbor act approved March 2, 1907.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Date.	Amount.
Prior to September 19, 1890 (see H. Doc. 421, 57th Cong., 2d sess.)	$2,468,228.92
September 19, 1890	170,000.00
July 13, 1892	200,000.00
August 18, 1894	200,000.00
June 3, 1896	195,000.00
March 3, 1899	150,000.00
June 13, 1902	150,000.00
Allotted from maintenance appropriation act April 28, 1904	30,000.00
March 3, 1905	150,000.00
June 30, 1906 (sundry civil act)	200,000.00
March 2, 1907	165,000.00
March 4, 1907 (sundry civil act)	100,000.00
May 27, 1908 (sundry civil act)	150,000.00
March 3, 1909 (allotment)	300,000.00
March 4, 1909 (sundry civil act)	100,000.00
June 25, 1910	400,000.00
Total	5,128,228.92

NOTE.—Rents, sales, etc., $33,633.02.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Freight traffic.

EXPORTS.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
FOREIGN AND COASTWISE—DOWNSTREAM.					
Cotton	370,671 bales	92,590	$23,429,215	30	....
Lumber	26,287,000 feet b. m	52,574	525,740	30	....
Gum logs	1,822,000 feet b. m	7,288	36,440	30	....
Crossties	319,118	19,945	139,615	30	....
Shingles	8,500,000	4,250	34,000	30	....
Rosin	77,767 barrels	12,443	311,075	30	....
Tar	16,759 barrels	2,014	30,210	30	....
Turpentine:					
Spirits	7,983 casks	1,796	269,400	30	....
Crude	821 barrels	126	3,780	30	....
Fish oil	2,800 barrels	630	47,250	30	....
Coal:					
On steamers	2,411 tons	2,411	8,438	30	....
On scows	12,136 tons	12,136	42,476	15	....
Cement (on scows)	5,170 barrels	1,034	6,462	22	....
Stone (on scows)	3,457 tons	3,457	6,914	22	....
Miscellaneous (dry goods, groceries, etc)	67,467 tons	67,467	10,445,380	....	....
Total [a]	....	280,161	35,336,395	....	....
INTERNAL—UPSTREAM.					
Brick	691,800	1,729	5,187	58	$0.15
Cotton-seed meal	551 tons	551	13,775	58	.028
Fertilizer	18,500 tons	18,500	555,000	91	.028
Fertilizer materials	75,966 tons	75,966	1,519,320	[b] 4	Cargo.
Fish	990 barrels	50	4,000	66	.043
General merchandise	17,675 tons	17,675	2,474,500	87	.077
Grain	27,655 bushels	692	27,225	70	.029
Hay	12,680 bales	634	12,680	72	.029
Lumber	1,000,000 feet b. m	2,000	20,000	45	.022
Machinery	566 tons	566	56,600	53	.035
Rice	500 bushels	12	600	35	.03
Coal	1,358 tons	1,358	4,753	3	Cargo.
Total	....	119,733	4,693,640	....	....

IMPORTS.

FOREIGN AND COASTWISE—UPSTREAM.					
Fertilizer and fertilizer materials	113,666 tons	113,666	$2,273,320	30	Cargo.
Coal	12,898 tons	12,898	64,490	30	Cargo.
Salt	10,255 tons	10,255	102,550	30	Cargo.
Oil and gasoline	7,314,711 gallons	22,904	731,471	30	Cargo.
Cement	57,696 barrels	11,539	115,390	30	Cargo.
Molasses	406,510 gallons	2,581	101,628	30	Cargo.
Grain	19,300 bushels	386	13,510	30	Cargo.
Cotton	5,583 bales	1,396	335,040	25	Cargo.
Turpentine:					
Spirits	3,890 casks	875	131,250	25	Cargo.
Crude	1,176 barrels	176	5,280	25	Cargo.
Rosin	13,943 barrels	2,230	55,750	25	Cargo.
Tar	2,019 barrels	303	4,545	25	Cargo.
Fish (for scrap)	7,236 tons	7,236	7,236	15	Cargo.
Fish	8,879 barrels	444	35,520	25	Cargo.
Clams and oysters	17,887 bushels	894	17,880	30	Cargo.
Fish oil	2,800 barrels	630	47,250	15	Flatted.
Cotton bagging	556 tons	556	59,889	30	Cargo.
Lumber	5,452,000 feet b. m	10,903	109,030	20	Flatted.

[a] All in cargoes to foreign and domestic ports.

[b] About.

COMMERCIAL STATISTICS—continued.

Freight traffic—Continued.

IMPORTS—continued.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried (miles).	Rate per ton-mile.
FOREIGN AND COASTWISE—UPSTREAM—continued.					
Wood	4,000 cords	4,000	$16,000	15	Flatted.
General merchandise	36,243 tons	36,243	5,074,020	30	Cargo.
Miscellaneous (country produce, fruits, etc.).	5,000 tons	5,000	375,000	25	Cargo.
Timber, cross-ties, etc	1,021,000 feet b. m	2,643	10,570	10	Rafted.
Rice, straw	14,500 bales	725	7,250	10	Flatted.
Total		248,483	9,693,869		
INTERNAL—DOWNSTREAM.					
Brick	650,000	2,126	6,375	30	Flatted.
Cotton	12,693 bales	3,173	761,520	91	$0.038
Cotton seed	101,800 bushels	2,036	40,720	71	.033
Turpentine:					
Crude	10,887 barrels	1,633	49,990	65	.019
Spirits	4,851 casks	1,112	165,800	66	.043
Rosin	30,843 barrels	4,935	123,375	66	.019
Tar	11,614 barrels	1,853	27,795	72	.021
Timber	37,482,000 feet b. m	114,259	457,036	53	Rafted.
Lumber	23,832,000 feet b. m	47,664	476,640	62	.03
Shingles	11,392,000	5,697	45,578	50	.023
Poles and piles	25,282	6,302	31,510	60	Rafted.
Cross-ties	282,008	16,437	112,959	66	Rafted.
Wood	15,468 cords	15,468	61,872	37	Rafted.
Miscellaneous	877 tons	877	83,720	63	.088
Horses, hogs, cattle, etc	3,392 head	478	45,460	66	.06
Total		224,049	2,490,350		

RECAPITULATION.

Total exports:					
Foreign and coastwise		280,161	$35,336,395		
Internal		119,733	4,693,640		
Total imports:					
Foreign and coastwise		248,483	9,693,869		
Internal		224,049	2,490,350		
Total commerce		872,426	52,214,254		
Gain over last year		8,355	2,361,079		

Statement of vessels of 100 tons and over at the port of Wilmington, N. C., for the calendar year ending December 31, 1909.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	104	63	167	275,136
Sailing	87	7	94	44,734
Barges	9		9	17,074
Total	200	70	270	336,944

The above does not include vessels coming to Southport in distress, for supplies, or for harbor. Neither does it include vessels owned by the United States Government.

In addition to the above statement, the following vessels are operated regularly on Cape Fear River:

Class.	Number.	Net registered tonnage.	Passengers.
Registered:			
Steamers	19	940	[a] 50,000
Tugs	21	444	....
Sailing	29	408	....
Unregistered:			
Barges	3	650	....
Flats	100	5,000	....
Rafts	180	....	....
Total	352	7,442	50,000

[a] This is approximate.

Freight transported.

Calendar year ending December 31—	Tons.	Calendar year ending December 31—	Tons.
1869	220,000	1899	621,852
1889	325,512	1900	699,356
1890	346,557	1901	727,359
1891	344,443	1902	841,631
1892	341,468	1903	843,337
1893	392,965	1904	856,011
1894	437,623	1905	871,106
1895	618,054	1906	814,291
1896	673,208	1907	870,556
1897	595,426	1908	864,071
1898	627,899	1909	872,426

Foreign commerce for the calendar year 1909.

[Furnished by the collector of customs of the port of Wilmington, N. C.]

Class of goods.		Quantity.	Value.	
			Exports.	Imports.
Cotton	bales	364,968	$23,088,000	....
Rosin	barrels	34,058	113,385	....
Lumber	M feet	2,445,000	49,130	....
Cross-ties	cubic feet	126,000	16,000	....
Gum logs	do	1,870,000	35,000	....
Spirits turpentine	gallons	8,672	3,555	....
Automobiles	pounds	3,500	5,000	....
Nitrate of soda	tons	14,019	....	$548,998
Kainit	do	31,897	....	203,769
Muriate potash	do	4,773	....	180,033
Sulphate of ammonia	pounds	4,101,396	....	64,247
Burlaps	do	1,112,118	....	59,889
Sulphate potash	tons	1,190	....	52,420
Guano	do	1,300	....	33,800
Sulphur ore	do	5,570	....	18,770
Manure salt	do	1,395	....	16,545
Peruvian guano	do	1,000	....	17,500
Pyrites	do	6,079	....	17,117
Molasses	gallons	80,692	....	14,569
Guano	tons	100	....	3,082
Salt	do	1,006	....	2,312
Fruit		....	....	770
Miscellaneous		....	....	3,368
Total		....	23,310,070	1,237,189

Cotton steamers loaded at the port of Wilmington, N. C., during the calendar year 1909.

Name of steamer.	Tonnage.	Draft loaded.		Number of bales.	Coal.
		Ft.	*in.*		*Tons.*
Cardigan	2,601	19		15,834	....
Othello	2,391	19		14,000	....
Ordendi Mendi	2,536	19	6	14,045	....
Vera	1,854	17	6	9,584	....
Khalif	2,218	20		12,281	601
Bangor	2,201	19		10,754	102
Axminster	1,231	15		5,759	310
Osceola	2,318	19	6	14,545	....
Tabaristan	1,836	21	6	10,102	59
Eretza Mendi	2,578	19		13,986	....
Putney Bridge	2,147	19	6	12,861	....
Hermia	1,305	16	6	7,167	....
Gretavale	2,009	18	6	11,713	....
Vauxhall Bridge	2,178	19		11,938	....
Gymeric	2,598	22		13,664	....
Brookby	2,371	18	6	12,723	....
Hillmere	2,299	20		14,179	....
George Fleming	2,228	18	6	11,836	....
Hillglen	2,776	20		15,850	....
Thistlemor	2,579	20	6	15,900	....
Nanette	1,368	16		7,100	....
Catalina	1,661	19	6	8,600	....
Wragby	2,371	18		11,827	....
Drumgeith	2,472	19	6	13,247	21
Norton	1,135	16		6,451	306
Battersea Bridge	2,171	19		12,685	446
Soutra	1,771	16	6	10,700	206
Tabaristan	1,836	21	6	10,200	....
Marianne	2,237	17	6	5,000	....
Holland	2,438	19	6	14,310	....
Harlyn	2,224	21		16,127	....
Total	66,028	....		364,968	2,051

APPENDIX N.

IMPROVEMENT OF RIVERS AND HARBORS IN THE CHARLESTON, SOUTH CAROLINA, DISTRICT.

REPORT OF CAPT. E. M. ADAMS, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Waccamaw River, North Carolina and South Carolina.
2. Little Pedee River, South Carolina.
3. Lynch River and Clark Creek, South Carolina.
4. Great Pedee River, South Carolina.
5. Winyah Bay, South Carolina.
6. Mingo Creek, South Carolina.
7. Santee, Wateree, and Congaree rivers, and Estherville-Minim Creek Canal, South Carolina.
8. Operating and care of lock and dam across Congaree River, South Carolina.
9. Inland waterways between Charleston Harbor, South Carolina, and opposite McClellanville, South Carolina.
10. Harbor at Charleston, South Carolina.
11. Wappoo Cut, South Carolina.
12. Removing sunken vessels or craft obstructing or endangering navigation.

United States Engineer Office,
Charleston, S. C., July 15, 1910.

Sir: I have the honor to inclose herewith annual reports for the fiscal year 1910 for the works of improvement of rivers and harbors in this district.

Very respectfully,
E. M. Adams,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

N 1.

IMPROVEMENT OF WACCAMAW RIVER, NORTH CAROLINA AND SOUTH CAROLINA.

Dredging was resumed in August and continued until the close of the month of December, during which time there were removed from Thoroughfare Cut 46,091 cubic yards of material and 236 stumps;

this work by way of maintenance. New boom for dipper dredge *No. 1* and general overhauling and repairs to this plant were made, for which this work bore a part of the cost. The expenditures for the year were $4,168.27. Average cost per cubic yard of material removed was 9 cents, including office expenses and repairs to plant.

In my opinion this improvement is worthy of further prosecution by the United States, but to an extent less than that contemplated by the present project. I recommend the adoption of the project as finally approved and published in House Document 514, Fifty-eighth Congress, second session, which contemplates a channel 12 feet deep to Bucksville; thence 6 feet deep to Conway, with limited snagging above Conway. The considerations upon which this view is based appear at length in the document cited.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $4,000

Submitted in compliance wtih requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

June 14, 1880	$15,000.00
March 3, 1881	10,000.00
August 2, 1882	4,400.00
July 5, 1884	6,000.00
August 5, 1886	15,000.00
August 11, 1888	15,000.00
September 19, 1890	12,500.00
July 13, 1892	10,000.00
August 18, 1894	6,000.00
June 3, 1896	6,000.00
March 3, 1899	3,000.00
June 13, 1902 (allotment Oct. 30, 1902)	9,000.00
March 3, 1905 (allotment Apr. 15, 1905)	$13,800.00
March 2, 1907 (allotment Mar. 15, 1907)	18,000.00
March 3, 1909 (allotment Apr. 9, 1909)	4,000.00
June 25, 1910	50,000.00
Receipts accounts of sales	21.06
Total	197,721.06

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
INWARD.			
Provisions		3,580	$289,461
Hardware, machinery, and mill supplies		1,303	101,657
Hay and grain		638	15,170
Canned goods	Cases	233	10,019
Cotton goods and shoes		197	236,317
Fertilizers		4,181	83,628
Shingles		3,542	21,389
Lumber	34,222 feet	77	413
Miscellaneous		216	21,640
		13,967	779,694

[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic—Continued.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
OUTWARD.			
Provisions		152	$18,525
Hardware, machinery, and mill supplies		22	1,559
Hay and grain		33	650
Canned goods	Cases	91.5	3,934
Fertilizers		125	2,504
Lumber	Feet	6,739	36,529
Shingles		8,673	88,271
Cross ties		227.25	1,590
Logs		78,275	91,595
Naval stores		965	42,280
Cotton	Bales	881.5	211,560
Cotton seed		584	17,535
Rice		59.25	4,740
Miscellaneous		302	30,175
		97,129	551,427
Total		111,096.5	1,431,121

Average haul or distance freight was carried, 35 miles.
Freight rates are per package, according to size and weight.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	658	658	57,506	12,214
Sailing	30	30	7,260	
Steam tugs (towboat duty)	458	458	[a] 7,568	
Unregistered: Rafts			78,275	
Total	1,146	1,146	150,609	12,214

[a] Approximate.

N 2.

IMPROVEMENT OF LITTLE PEDEE RIVER, SOUTH CAROLINA.

During the months of January, February, and March the snag boat *Great Pedee* removed from the channel and banks of the river a total of 529 obstructions, at an expenditure of $1,635.99, including office expenses.

This improvement is worthy of limited further prosecution, the reasons for which statement are fully set forth in the report of preliminary examination published in House Document 862, Sixty-first Congress, second session. I recommend that further improvement be confined to maintenance of the section of the river from its mouth up to Gallivants Ferry, 47 miles.

No estimate for funds is submitted.

APPROPRIATIONS.

August 11, 1888	$5,000
September 19, 1890	5,000
July 13, 1892	5,000
August 18, 1894	4,000
June 3, 1896	3,000
June 13, 1902 (allotment, Oct. 30, 1902)	1,500
March 3, 1905 (allotment, Apr. 15, 1905)	1,200
March 2, 1907 (allotment, Mar. 15, 1907)	$2,000
June 25, 1910	20,000
Total appropriations	46,700
Receipts account of sales	10
Total	46,710

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
INWARD.			
Fertilizers		890	$17,800
Miscellaneous		125	5,260
		1,015	23,060
OUTWARD.			
Naval stores		30	2,150
Cotton	Bales	75	18,000
Cotton seed		60	1,800
		165	21,950
Total		1,180	45,010

Average haul or distance freight was carried, 30 miles. Package rates obtain.

Vessel classification.

Class.	American.	Net registered tonnage.
Unregistered: Steam flat	[a] 150	3,300

[a] Approximate; no accurate record was kept.

N 3.

IMPROVEMENT OF LYNCH RIVER AND CLARK CREEK, SOUTH CAROLINA.

During December and January the snag boat *Great Pedee* removed from the channel and banks of Clark Creek and Lawrence Cut 446 obstructions, consisting of trees, logs, stumps, and snags. The expenditures were $630. Unit cost, $1.41.

This improvement is not worthy of further prosecution by the United States. The reasons for this statement are set forth at length in report of preliminary examination published in House Document No. 695, Sixty-first Congress, second session. I recommend that this improvement be abandoned.

No estimate for funds is submitted.

APPROPRIATIONS.

August 11, 1888	$2,500.00
September 19, 1890	2,500.00
July 13, 1892	2,500.00
March 2, 1907	2,000.00
Total appropriations	9,500.00
Receipts account of sales	.25
Total	9,500.25

N 4.

IMPROVEMENT OF GREAT PEDEE RIVER, SOUTH CAROLINA.

The dredge *Cheraw* during the months of July and August removed from Jacobs Island shoal 11,988 cubic yards of material and from Thompson Creek shoal 4,952 cubic yards of material, a total of 16,940 cubic yards. The snag boat *Great Pedee*, operated during the months September to May, removed from the banks 14 trees and from the channel 1,201 logs, 404 stumps, and 1,353 snags; total, 2,972 obstructions. This plant was snagged and sunk on May 24; it was raised, taken to Georgetown, and dismantled.

The work done during the year was all for maintenance; the expenditures were $14,954.78.

This improvement is worthy of further prosecution by the United States, but to an extent less than that contemplated by the present project.

The present project was completed in 1909, at which time there was available a channel 9 feet deep from Winyah Bay up to Smiths Mills and 3½ feet deep thence up to Cheraw. The river was then in better condition than at any previous time in its history, but almost immediately after the completion of this improvement steamer navigation upon the upper Great Pedee was abandoned. The steamboat company which had been operating on that section of the river discontinued operations, sold out its plant, and went out of business. There is no prospect of resumption of steamer traffic on the upper river.

To maintain the dredged channels in the upper river will be costly and it will benefit no present or prospective commerce. It will be more costly to maintain the dredged channels continuously than to restore them at such time in the future as any need therefor may develop.

On the lower Great Pedee there is a reasonable traffic; steamers operate between Georgetown and various points up to Birches Ferry 87 miles. The channel may properly be maintained in this section, which will require no dredging and only limited snagging. The cost will, I believe, be commensurate with the benefits derived. I recommend that the improvement from Georgetown up to Birches Ferry be maintained by snagging. I recommend that the improvement from Birches Ferry up to Cheraw be, for the present, discontinued, and be resumed only when, as a result of formal preliminary examination, it can be shown that changed conditions justify resumption.

No estimate of funds is submitted.

APPROPRIATIONS.

June 14, 1880	$7,000.00
March 3, 1881	6,000.00
August 2, 1882	6,000.00
July 5, 1884	8,000.00
August 5, 1886	20,000.00
August 11, 1888	20,000.00
September 19, 1890	12,500.00
July 13, 1892	10,000.00
August 18, 1894	6,000.00
June 3, 1896	12,000.00
March 3, 1899	4,000.00
June 13, 1902	22,500.00
March 3, 1903	40,000.00
April 28, 1904	10,000.00
March 3, 1905	$15,000.00
March 3, 1905	5,000.00
March 2, 1907	20,000.00
March 4, 1907	30,000.00
May 27, 1908	11,300.00
March 3, 1909 (allotment Apr. 7, 1909)	10,000.00
June 25, 1910	30,000.00
Total appropriations	305,300.00
Receipts on account of sales	61.21
Total receipts	305,361.21

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
INWARD.		
Cotton goods and shoes	28	$31,800
Provisions	1,463	140,966
Hardware, machinery, and mill supplies	459	43,359
Hay and grain	259	5,490
Canned goods (in cases)	29	1,261
Drugs	3	2,700
Fertilizer	3,831	76,620
Miscellaneous merchandise	707	27,595
	6,779	329,791
OUTWARD.		
Lumber	7,999	49,894
Shingles	145	1,450
Naval stores	377	17,347
Cotton	2,150	516,000
Rice	84	2,400
Cross-ties	146	1,022
Logs	42,459	52,731
Cotton seed	1,412	42,360
Wood	300	400
Miscellaneous merchandise	4,934	489,300
	60,006	1,172,904
Total	66,785	1,502,695

Average haul or distance freight was carried, 50 miles. Package rates obtain.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	128	128	27,750	165
Sailing	40	40	8,124	
Steam tugs (towboat duty)	192	192	[a]7,042	
Unregistered:				
Steam tugs (towboat duty)	214	214	[a]1,712	
Rafts			42,459	
Total	574	574	87,087	165

[a] Approximate.

N 5.

IMPROVEMENT OF WINYAH BAY, SOUTH CAROLINA.

The dredge *Winyah Bay*, during October, November, and December, removed 90,615 cubic yards of material from the eastern channels; this work was in maintenance of 15-foot depth. Repairs were made to dipper dredge *No. 1* at an approximate cost of $1,500, and to dredge *Winyah Bay* under contract at a cost of $1,739.15 (part of the cost of annual repairs). The expenditures for the year were for maintenance, and amounted to $14,175.18.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

August 5, 1886	$18,750.00
August 11, 1888	100,000.00
September 19, 1890	100,000.00
July 13, 1892	100,000.00
August 18, 1894	110,000.00
June 3, 1896	20,000.00
June 4, 1897	350,000.00
July 1, 1898	450,000.00
March 3, 1899	58,500.00
June 6, 1900	285,000.00
March 3, 1901	500,000.00
June 28, 1902	35,000.00
March 3, 1903	100,000.00
April 28, 1904	70,000.00
March 3, 1905	75,000.00
March 3, 1905	$10,000.00
March 2, 1907	30,000.00
March 4, 1907	72,750.00
March 3, 1909 (allotment Apr. 10, 1909)	15,000.00
June 25, 1910	150,000.00
Total appropriations	2,650,000.00
Received on account of sales and rent of dredge	6,819.05
Total receipts	2,656,819.05

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	804		804	1,226,165	[a] 97
Sailing	793	2	795	840,426	
Steam tugs (towboat duty)	708		708	[a] 27,116	
Unregistered:					
Steam tugs (towboat duty)	52		52	[a] 416	
Rafts				4,518	
Total	2,357	2	2,359	2,098,641	97

[a] Approximate.

CONTRACT.

Name of contractor: Samuel J. Pregnall.
Contract for: Annual repairs to dredge.
Price: Estimated, $8,000; actual, $7,139.15.
Date of contract: August 2, 1909.
Date of beginning: August 5, 1909.
Date of expiration: September 23, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Georgetown, S. C., January 1, 1909, to December 31, 1909.

	Arrived.			Cleared.		
	No.	Tonnage.	Crew.	No.	Tonnage.	Crew.
Coastwise: American vessels	887	1,087,625	13,479	798	981,480	12,920
Foreign ports: Foreign vessels	2	676	16	2	676	16
Total	889	1,088,301	13,495	800	982,156	12,938

Freight traffic.

Article.	Amount in short tons.	Valuation.
INWARD.		
Provisions	13,162	$954,193
Hardware, machinery, and mill supplies	5,940	424,886
Hay and grain	3,555	71,355
Canned goods	896	50,741
Cotton goods and shoes	227	189,158
Drugs	26	23,400
Fertilizer	156	3,128
Whisky and wine	167	60,177
Logs	4,518	5,515
Fish, oysters, and clams	274	34,714
Miscellaneous	2,412	244,200
	31,333	2,061,467
OUTWARD.		
Lumber	290,070	1,918,298
Shingles	6,038	63,718
Canned goods	60	2,580
Oars	77	18,480
Naval stores	4,408	232,352
Cotton	3,575	858,000
Rice	31	2,480
Cross-ties	1,727	12,089
	305,986	3,107,997
Total	337,319	5,169,464

N 6.

IMPROVEMENT OF MINGO CREEK, SOUTH CAROLINA.

The small balance, $42.25, remaining of an allotment from the emergency appropriation provided by the river and harbor act of March 2, 1907, was applied to office expenses.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

August 11, 1888	$5,000
September 19, 1890	5,000
July 13, 1892	3,000
August 18, 1894	4,000
March 3, 1905 (allotment, May 31, 1905)	300
March 2, 1907 (allotted Mar. 18, 1908)	$300
June 25, 1910	1,000
Total	18,600

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount in short tons.	Valuation.
INWARD.		
Provisions	1,384	$138,389
Hardware, machinery, and mill supplies	259	22,408
Hay and grain	194	4,290
Canned goods	11	484
Cotton goods and shoes	18	19,150
Drugs	2	1,980
Fertilizer	2,460	4,960
Lumber	141	752
Miscellaneous	65	6,740
	4,534	199,153
OUTWARD.		
Lumber	313	1,670
Shingles	30	300
Naval stores	913	41,998
Cotton	1,201	288,240
Cross-ties	78	546
Cotton seed	1,163	33,890
Miscellaneous	561	7,564
	4,259	374,208
Total	8,793	573,361

Average haul or distance freight was carried, 11 miles.

Package rates obtain.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.
Registered:			
Steamers	420	420	30,876
Steam tugs	62	62	[a] 978
Total	482	482	31,854

[a] Approximate.

N 7.

IMPROVEMENT OF SANTEE, WATEREE, AND CONGAREE RIVERS, SOUTH CAROLINA.

(A) SANTEE RIVER.

The snag boat *Camden* in December removed 68 obstructions endangering navigation between miles 142 and 143 above the mouth.

The dredge *Congaree* during January and February removed from the Winyah Bay end of the Estherville-Minim Creek Canal 23,544 cubic yards of material, and dredge *No. 1*, operated during March, April, and May, removed 17,419 cubic yards at points along the canal, restoring the 6-foot depth.

The expenditures during the year for this work of maintenance were $6,786.74.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $12,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 3, 1881	$22,000.00
August 3, 1882	20,000.00
July 15, 1884	15,000.00
August 5, 1886	18,750.00
August 11, 1888	24,000.00
September 19, 1890	30,000.00
July 13, 1892	30,000.00
August 18, 1894	40,000.00
June 3, 1896	48,000.00
March 3, 1899	20,000,00
June 13, 1902 (allotment, Oct. 29, 1902)	15,000.00
June 13, 1902 (allotment, May 26, 1904)	7,000.00
March 3, 1905 (allotment, May 10, 1905)	25,000.00
March 2, 1907 (allotment, June 15, 1907)	$33,000.00
March 3, 1909 (allotment, Apr. 5, 1909)	5,600.00
June 25, 1910 (allotment)	2,000.00
Total appropriations	355,350.00
Account of sales at auction	123.97
Total receipts	355,473.97
Transferred to allotment for Congaree River, South Carolina	5,000.00
Net receipts	350,473.97

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Provisions	100	$11,332
Hardware, mill supplies, and machinery	11	316
Hay and grain	37	858
Canned goods	5	215
Lumber	5,570	29,688
Logs	73,459	89,901
Miscellaneous merchandise	320	32,050
Total	79,502	164,360

Average haul or distance freight was carried, 143 miles.

Rate per ton-mile: Through New York, 1.9 cents; Baltimore, 1.8 cents. Local: Package rates.

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[a] Exclusive of the balance unexpended July 1, 1910.

Vessel classification.

[Estherville-Minim Creek Canal.]

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	744	744	20,542	1,225
Steam tugs (towboat duty)	320	320	[a] 5,666	....
Unregistered:				
Steam tugs (towboat duty)	132	132	[a] 1,056	....
Rafts	....	....	39,869	....
Total	1,196	1,196	67,133	1,225

[a] Approximate.

(B) WATEREE RIVER.

The snag boat *Wateree* operated on this stream during the months of July, August, November, December, January, March, April, and May; removed a total of 3,934 obstructions. The snag boat *Camden*, in August, September, October, December, and January removed a total of 2,047 obstructions. These obstructions consisted of trees from the banks, and logs, stumps, and snags from the channel.

This work, considered as maintenance, at an expenditure of $20,103.90.

APPROPRIATIONS.

March 3, 1881	$8,000.00
August 2, 1882	15,000.00
July 5, 1884	5,000.00
August 5, 1886	7,500.00
August 11, 1888	12,000.00
September 19, 1890	12,500.00
July 13, 1892	2,500.00
August 18, 1894	2,500.00
June 3, 1896	5,000.00
March 3, 1899	2,500.00
March 3, 1905 (allotment, May 10, 1905)	$25,000.00
March 2, 1907 (allotment, June 15, 1907)	50,000.00
March 3, 1909 (allotment, Apr. 5, 1909)	14,300.00
June 25, 1910 (allotment)	14,000.00
Receipts account sales	19.52
Total	175,819.52

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Logs	3,443	$4,166

Average haul or distance freight was carried, 35 miles.

(C) CONGAREE RIVER.

Snagging was carried on intermittently in August, September, October, November, April, May, and June. A total of 2,241 obstructions, consisting of 68 trees from the banks and 2,173 logs, stumps, and snags from the channel, were removed by the snag boats *Wateree* and *Camden* and derrick *A*.

Dredging was done as required to maintain the 4-foot depth over the shoals after each freshet; a total of 82,588 cubic yards of sand was dredged; no dredging was done after November.

For use in connection with the dredge *Congaree*, 13 pontons were constructed.

The expenditures for the year on this work of maintenance were $24,623.64.

This project is worthy of prosecution by the United States, with the exception of so much as contemplates a 4-foot channel by way of Wateree River up to Camden, which latter part, in my opinion, is not worthy of further prosecution.

Work upon the Wateree was abandoned in 1889 by reason of suspension of traffic, since which date the only commerce has been logging, which has been limited both in quantity and value. In 1907, by reason of an apparent revival of interest, work was resumed, which action appears to have been based upon the assurance given by local interests that steamer traffic would be resumed at an early date. Expectation of steamer traffic appears not to have been justified. After thorough inquiry I find no reason for expecting that steamer traffic on the Wateree River will be resumed. In my opinion, freight available for export by this waterway is too small in amount and value to justify placing a steamer line in operation. Similarly, the communities interested are so small and their requirements are so few that it is not likely that any import steamer trade will be developed. Inquiries recently addressed to interested parties elicit no sufficient response.

While there is a small amount of logging by rafts carried upon the Wateree, I believe that expenditures required to keep the channel open are not justified by such traffic.

I recommend that the improvement of Santee and Congaree rivers and Estherville-Minim Creek canal be continued. I recommend that improvement of Wateree River be discontinued until such time as it can be shown by formal preliminary examination that resumption of work is justified.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $35,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

August 5, 1886	$7,500.00
August 11, 1888	7,500.00
September 19, 1890	5,000.00
July 13, 1892	5,000.00
August 18, 1894	4,000.00
June 3, 1896	2,000.00
June 13, 1902 (allotment Oct. 29, 1902)	5,000.00
March 3, 1905 (allotment, May 10, 1905)	25,000.00
March 2, 1907 (allotment, June 15, 1907)	67,000.00
March 2, 1907 (allotment, Nov. 10, 1908)	5,000.00
March 2, 1907 (allotment, Nov. 12, 1908)	$5,125.00
March 2, 1907 (allotment, Feb. 17, 1909)	1,800.00
March 3, 1909 (allotment, Apr. 5, 1909)	28,100.00
June 25, 1910 (allotment)	79,000.00
Total appropriations	247,025.00
Receipts account sales	44.28
Total	247,069.28

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Timber and timber products	13,772	$16,664
Drugs	117	2,925
Cotton goods and shoes	226	5,650
Provisions	3,057	76,425
Fertilizer	50	1,250
Hardware, mill supplies, and machinery	4,179	104,475
Miscellaneous merchandise	4,953	123,825
	26,354	331,214

Average haul or distance freight was carried, 40 miles.
Rate per ton-mile: Through: New York, 1.9 cents; Baltimore, 1.8 cents. Local: Package rates.

N 8.

OPERATING AND CARE OF LOCK AND DAM ACROSS CONGAREE RIVER, NEAR COLUMBIA, SOUTH CAROLINA.

The flood of 1908 left heavy deposits of sand in the upper stretches; this gradually works downstream, most of it has passed the dam, but much lodges in the lock; to remove this dredging had to be done in July and August, in December and January, and again in April. A broken heelpost in one of the gates was replaced in October. During much of the time from February to June, inclusive, only a small force was required; the remainder of the regular force were employed upon adjacent works.

The distribution of expenditures for the year was:

	Services.	Materials.	Total.
Pay of regular force (lock keeper, 2 ship keepers, and 6 laborers)	$4,302.63		$4,302.63
Office and telephone rent	201.07		201.07
Superintendence	712.38		712.38
Regular supplies (oil, etc.)		$51.60	51.60
Minor repairs	10.00	30.16	40.16
Small additions and renewals		92.59	92.59
Storehouse and shop	82.28	267.00	349.28
Replacing heelpost and painting gate	154.25	189.92	344.17
Extra work, chiefly dredging	231.50		231.50
Total	5,694.11	631.27	6,325.38

N 9.

IMPROVEMENT OF INLAND WATERWAYS BETWEEN CHARLESTON, SOUTH CAROLINA, AND OPPOSITE M'CLELLANVILLE.

No work was done; the expenditures, $772.13, were in payment of outstanding liabilities at the beginning of the year and payment for the collection of commercial statistics.

This work has been prosecuted under small appropriations from time to time, funds never having been made available in sufficient quantity to permit of vigorous prosecution or approximation to completion. For this reason the waterway has been for a number of years in an incomplete condition, such that only partial utilization has been practicable. Under these circumstances it is not yet possible to form a correct estimate of the benefit conferred or the traffic to be induced, and it will be impossible to form such estimate until the waterway shall have been completed and opened to continuous traffic.

I believe that having been carried on to its present stage this work should be pushed to completion; subsequent maintenance to be determined by the value of commerce induced.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $41,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Act of June 13, 1902	$50,000
Act of March 2, 1907	75,290
Act of March 3, 1909 (allotment, Apr. 7, 1909)	5,000
Act of June 25, 1910	25,000
Total	155,290

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
TOWARD M'CLELLANVILLE.		
Fertilizer	3,461	$96,908
Oysters in shell	671	1,677
Miscellaneous merchandise	2,845	284,500
	6,977	383,085
FROM M'CLELLANVILLE.		
Sea-Island cotton	435	304,500
Short cotton	198	59,400
Cotton seed	825	16,500
Vegetables	938	140,700
Naval stores	1,133	97,871
Rice	18	702
Oysters in shell	7,500	16,875
Canned goods	121	14,520
Timber	8,812	62,684
Beef, mutton, fish, and game	446	27,091
Lumber	5,460	32,760
Cord wood	6,485	7,949
	32,371	781,552
Total both ways	39,348	1,164,637

Average haul or distance freight was carried: 50 miles. Package rates.

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[a] Exclusive of the balance unexpended July 1, 1910.

N 10.

IMPROVEMENT OF HARBOR AT CHARLESTON, SOUTH CAROLINA.

The *Winyah Bay* in July dredged 22,194 cubic yards of material near the junction of the Fort Sumter and Mount Pleasant ranges; no other dredging was required during the year to maintain the channel; annual survey shows full dimensions throughout.

The dredge was repaired under contract in July and August at a cost of $5,400.

A tide-gauge house was built and new tide gauge installed at a cost of $721.10.

Surveys were made to secure data for use in connection with the prosecution of the 28-foot project adopted by the recent river and harbor bill.

The total expenditures for the year were $21,183.56, of which $648.29 was on account of surveys of quarantine stations.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

June 18, 1878	$200,000.00
March 3, 1879	200,000.00
June 14, 1880	170,000.00
March 3, 1881	175,000.00
August 2, 1882	300,000.00
July 5, 1884	250,000.00
August 5, 1886	187,500.00
August 11, 1888	350,000.00
September 19, 1890	370,000.00
July 13, 1892	225,000.00
March 3, 1893	750,000.00
August 18, 1894	450,000.00
March 2, 1895	500,000.00
June 6, 1900	220,000.00
June 13, 1902	45,000.00
June 28, 1902	50,000.00
March 3, 1903	$60,000.00
April 28, 1904	73,000.00
March 3, 1905	25,000.00
March 3, 1905	25,000.00
March 2, 1907	25,000.00
March 3, 1909 (allotment April 5, 1909)	25,000.00
June 25, 1910	150,000.00
Total appropriations	4,825,500.00
Received for rent and care of dredge, and account sales at auction	13,420.03
Total receipts	4,838,920.03

CONTRACT IN FORCE.

Name of contractor, Samuel J. Pregnall.
Contract for annual repairs to dredge.
Price, estimated, $8,000; actual, $7,139.15.
Date of contract, August 2, 1909.
Date of beginning, August 5, 1909.
Date of expiration, September 23, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

Vessel classification.

	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Sailing	212	2	214	2,000,640	[a] 5,922
Steamers	651	129	780		

[a] Carried by Clyde Line steamers, leaving Charleston.

Above includes steamers and sailing vessels of 100 tons or more.

Vessels entered and cleared, port of Charleston, calendar year 1909.

	Entered.			Cleared.		
	No.	Tonnage.	Crew.	No.	Tonnage.	Crew.
Coastwise trade	225	494,503	10,886	71	152,228	2,083
Foreign trade	112	175,048	2,923	62	62,420	1,402
Total	337	669,551	13,809	133	214,648	3,485

Value of imports	$3,557,902.00
Value of exports	8,463,052.00
Duties on imports	57,923.91

COMMERCIAL STATISTICS FOR CHARLESTON HARBOR, S. C., 1909.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
EXPORTS.			IMPORTS—Continued.		
Lumber and cross ties	133,015	$992,677	Pyrites	67,014	$369,267
Fertilizer	1,710	51,300	Guano	5,601	151,608
Acid phosphate	294	2,940	Fish scrap	19,159	558,859
Clay	19,516	39,032	Sulphate of potash	935	41,205
Cotton, upland	60,095	12,019,085	Fertilizer material	9,662	215,394
Cotton, sea island	3,923	2,353,547	Lime, cement, and plaster	44,097	281,598
Cotton-seed meal	2,157	56,082	Jute butts	9,579	283,369
Cotton goods	43,816	35,052,530	Burlaps	5,193	678,610
Cotton factory sweepings	426	59,640	Refined oil and gasoline	16,058	481,940
Cotton-seed, cake and oil	2,045	204,500	Coal	83,352	329,963
Rice	2,045	204,520	Salt	10,355	74,208
Naval stores	2,696	299,600	Egyptian cotton	308	184,800
Miscellaneous	19,886	1,828,120	Fruit	4,904	594,590
Vegetables	1,620	324,300	Rice	10,285	617,093
Boots and shoes	219	218,600	Coffee	2,670	890,556
Canned goods	2,170	303,800	Sugar, refined	30,445	2,438,475
			Cotton fabrics	2,712	2,168,891
	295,633	54,010,273	Flour	7,801	624,020
			Canned goods	12,086	1,678,004
IMPORTS.			Shoes	1,107	1,091,400
			Lumber	495	94,886
Tankage	5,631	122,816	Potatoes	8,024	641,924
Muriate of potash	5,363	208,302	Miscellaneous	88,901	8,815,020
Kainit	44,566	335,328			
Nitrate of soda	18,590	888,930		532,696	25,243,411
Sulphate of ammonia	3,919	218,265			
Manure salt	13,884	155,089	Total	828,329	79,253,684

N 11.

IMPROVING WAPPOO CUT, SOUTH CAROLINA.

(See p. 376, Annual Report of the Chief of Engineers, 1910.)

APPROPRIATIONS.

March 3, 1881	$10,000
August 2, 1882	10,000
July 5, 1884	3,000
August 5, 1886	5,000
August 11, 1888	5,000
September 19, 1890	10,000
July 13, 1892	10,000
August 18, 1894	$7,000
June 3, 1896	2,500
June 13, 1902	8,000
March 3, 1905 (allotment, Jan. 14, 1910)	2,500
Total	73,000

CONTRACT IN FORCE.

Name of contractor: Simons-Mayrant Company.
Contract for: Dredging.
Price: 19¾ cents per cubic yard.
Date of contract: February 14, 1910.
Date of beginning: February 17, 1910.
Date of expiration: March 10, 1910 (time limit waived).

N 12.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

U. S. S. Housatonic, Charleston Harbor, South Carolina.—The expenditure for this work was in final payment to the contractor in the sum of $3,240 for work done in the previous fiscal year, for report of which see page 1316, Appendix N, Report of the Chief of Engineers, 1909.

Wreck in Great Pedee River, South Carolina.—For the purpose of removing the wreck of a Confederate gunboat in Great Pedee River, near Pedee Station, S. C., an allotment of $2,000 was made October 19, 1908. No work had been done until the month of June, 1910, when the dredge *Cheraw* was sent to the site of the wreck, which was broken up by blasting with dynamite. At the close of the month the plant was engaged in moving the fragments to the bank of the river where they could not hinder navigation. The expenditures were $215.47.

Sunken caisson, Port Royal Naval Station, South Carolina.—This wreck had been removed during the year 1909 (see p. 1317, Appendix N, Annual Report of the Chief of Engineers, 1909). The expenditures during the year were in payment of outstanding liabilities, $115.40.

Derelict Firth, Port Royal Sound, South Carolina.—See page 377, Annual Report of the Chief of Engineers, 1910.

Tugboat Buck, Charleston Harbor, South Carolina.—See page 378, Annual Report of the Chief of Engineers, 1910.

APPENDIX O.

IMPROVEMENT OF RIVERS AND HARBORS IN THE SAVANNAH, GEORGIA, DISTRICT.

REPORT OF COL. DAN C. KINGMAN, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Savannah Harbor, Georgia.
2. Savannah River, below Augusta, Georgia.
3. Savannah River, at Augusta, Georgia.
4. Savannah River, above Augusta, Georgia.
5. Harbor at Darien and Doboy bar, Georgia.
6. Sapelo Harbor, Georgia.
7. Altamaha, Oconee, and Ocmulgee rivers, Georgia.
8. Club and Plantation creeks, Georgia.
9. Brunswick Harbor, Georgia.
10. Inside water route between Savannah, Georgia, and Fernandina, Florida.
11. Skidaway Narrows, Georgia.
12. Fernandina Harbor, Florida, and Cumberland Sound, Georgia and Florida.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., July 18, 1910.

SIR: I have the honor to transmit herewith my annual report for the fiscal year ending June 30, 1910, upon the works of river and harbor improvements in my charge.

Very respectfully, your obedient servant,

DAN C. KINGMAN,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

O 1.

IMPROVEMENT OF SAVANNAH HARBOR, GEORGIA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

For a detailed history of the work, see Annual Reports of the Chief of Engineers for 1903, pages 1146–1152; for 1904, pages 1644–1647; for 1905, pages 1260–1262; for 1906, pages 1187–1190; for 1907, pages 1272–1274; for 1908, pages 1327–1330; and for 1909, pages 1319–1327.

The 26-foot project for Savannah Harbor, from the city to the sea, at an estimated cost of about $2,700,000, was not adopted by Congress in its entirety, but in the river and harbor act of 1907 the improvement was undertaken in a tentative or experimental manner, and an expenditure of $1,000,000, under continuous contracts, was authorized for the purpose.

The result of this experiment and the conclusions drawn therefrom are fully set forth in the Report of the Chief of Engineers for 1909, pages 1320–1324. It was therein shown that the project could probably be carried to completion at a cost of $1,545,000 in addition to the $1,000,000 originally authorized. Upon this Congress, in the river and harbor act of 1910, formally adopted the project and proposed to complete the same in four years, and the first installment of $400,000 was appropriated by the act.

During the past year the work of improvement has been carried on in accordance with the lines laid down. A rather large proportion of jetty work for the purpose of regulation was done during the year, about one-third of the total expenditure being for this purpose. As a result the regulation works have perhaps been advanced a little beyond the point reached by the dredging, and it will probably not be desirable to do any more jetty work until the dredging is further advanced.

A complete survey of the river has been made from Kings Island, or Cross Tides, above the city of Savannah, to the sea, and this has been carefully compared with the results of previous surveys. There had been no survey of the extreme upper portion of this section since 1905, and none along the city front since 1908. Over the rest of the distance comparison could be made with the surveys had a year ago.

The result shows that there has been a general scour over the entire section under consideration from Kings Island to the ocean. The total amount of material scoured out during the period covered by the comparison is 1,179,500 cubic yards in excess of the dredging done during the period. It is not to be assumed that this scour is wholly available for the advancement of the project, for it is not. Much of it occurs in comparatively shallow water, and some of it in places where the depth now exceeds the project requirement. But the whole scour does have the effect of advancing the regimen of the river toward a complete regulation, or bringing it to a point most favorable for a uniform flow, and it shows plainly that any sedimentary material brought down from the upper portion of the river is being carried out to sea and not lodging in the channel on the way down. The scour is about equally divided between the portion of the harbor above Fort Pulaski and that portion below.

The dredging, other than rehandling, done during the year amounts to 1,916,913 cubic yards, of which about one-third was in the river above Fort Pulaski and two-thirds below. Part of this work above Fort Pulaski was simply for maintenance, but a good deal of it tends to advance the project and may be regarded as permanently efficient work.

Nine hundred and forty-six thousand six hundred and fifty-eight cubic yards of material have been rehandled and cast ashore or put into permanent places of deposit. This rehandling has gained on the work of the seagoers and left unfilled basins capable of containing about 170,000 cubic yards, which, of course, will be filled later on.

As heretofore, the bar has been regarded as the crucial point. Only a little work, however, has been done upon the bar during the past year. About 185,000 cubic yards of material have been excavated upon what is called the bar, which now has a length of 9,600 feet, and this bin measurement differs from the place measurement, as determined by the survey, by considerably less than 2 per cent, showing that if any fill has taken place during the past year it must be exceedingly small. The existing channel on the bar has a depth of 26 feet or over at mean low water for an average width of 240 feet, the minimum width at any point being 150 feet. The 25-foot contours are nowhere less than 280 feet apart and have an average distance between them of 340 feet; the 24-foot contours are nowhere less than 340 feet apart and have an average distance between them of 430 feet; the 23-foot contours average 550 feet apart, and the 21-foot contours do not approach each other nearer than 550 feet. It will require the removal of 280,000 cubic yards to complete the work on the bar.

Upon Tybee Roads, a length of channel 16,550 feet, most of the work of dredging has been done. Over 750,000 cubic yards of material, bin measurement, has been removed from this section, and the channel condition is as follows: The 26-foot channel lacks only 200 feet of being continuous throughout the distance. Its average width is 390 feet and its least width at any point 150 feet. The 25-foot contours average 550 feet apart; the 24-foot contours average 720 feet apart, with a least distance of 450 feet; the 23-foot contours average 910 feet apart, with a least distance between them of 620 feet. This channel lacks about 300,000 cubic yards of completion. There has been a considerable amount of scour here in excess of the dredging done. This accounts in part for excessive widths; but it is clear, also, that the work of seagoing dredges can not be made very accurate in places so distant from ranges and marks as Tybee Roads or Tybee bar. A good deal of the excess dredging from overdepth or off-range work will necessarily result.

On Tybee Knoll about 300,000 cubic yards was dredged, a good deal of it being rehandled. The dredging has been effective, and a scour of nearly 400,000 cubic yards in excess of the bin measurement has taken place—this over a length of about 21,000 feet. There is now a 24-foot low-water channel along this distance having an average width of 350 feet and lacking only about 1,000 feet of being continuous.

Elsewhere on the river between the city and the sea the old project depth of 28 feet, at mean high water, has been maintained and generally improved upon. A comparison of the automatic tide gauges on the river indicates a slight raising of the low-water plane at Fort Pulaski and at old Fort Oglethorpe, the amount being possibly as much as 0.3 of a foot at the lower point and 0.2 foot at the upper point. This has no doubt resulted from the increased power of control given to the regulating works. Their effect is mostly felt in the lower half of the ebb tide, and this might tend to keep a little more water in the river and to lift the low-water plane. It will, therefore, be desirable during the coming year to devote every effort to dredging and to do no more regulating work until the increased channel capacity resulting from dredging counteracts the effect of the contraction works.

I estimate that the work has been about 40 per cent completed, and about 36 per cent of the total cost has been expended; and considering the amount remaining to be done, there seems no reason why it can not all be accomplished for the amount estimated.

During the year the two seagoing dredges *Savannah* and *Cumberland* and the hydraulic dredge *Morgan* have been employed in improving and maintaining the harbor of Savannah, except when they were necessarily undergoing repairs. The *Savannah* and *Cumberland* together dredged a total of 1,704,291 cubic yards of material, measured in their bins, of which the *Savannah* removed 837,345 cubic yards, at a total cost, including all repairs, of 6.9 cents per cubic yard, and the *Cumberland* removed 866,946 cubic yards, at a total cost, including all repairs, of 6.3 cents per cubic yard. Of this material, 165,022 cubic yards was dredged from the outer bar, 299,610 cubic yards from Tybee Knoll, 783,385 cubic yards from Tybee Roads, and 456,274 cubic yards from the harbor above Fort Pulaski. The dredge *Morgan* removed a total of 962,634 cubic yards, of which 212,622 cubic yards was dredged from the channel above Fort Pulaski, making a total of 668,896 cubic yards of material removed by all of the dredges above this point. This material was removed from the following localities, viz: City front, 36,542 cubic yards; Obstructions channel, 31,355 cubic yards; Upper flats, 56,988 cubic yards; Lower flats, 75,960 cubic yards; Long Island Crossing, 261,843 cubic yards; and Quarantine channel, 206,208 cubic yards. (See map published opposite page 1332, Annual Report of the Chief of Engineers for 1909.)

Of the total amount of material removed by the seagoing dredges *Savannah* and *Cumberland*, both above and below Fort Pulaski, viz: 1,704,291 cubic yards, a total of 946,658 cubic yards were rehandled from three basins of deposit, viz: Red Light, Venus Point mooring dolphin, and basin near entrance to Mud River Cut. Of this amount, 750,012 cubic yards were rehandled by the dredge *Morgan* and 196,646 by a hired pump dredge. The cost of dredging by the *Morgan* was 16.9 cents per cubic yard at the City front, 5 cents per cubic yard at Obstructions and 6 cents per cubic yard at quarantine, and of rehandling material from basins of deposit, 7.3 cents per cubic yard, including cost of repairs.

Work in the river above Fort Pulaski was primarily for the purpose of maintenance, but it has tended to advance the project.

The open-market agreement, made the latter part of the preceding fiscal year with the Savannah Dredging Company, for rehandling dredged material at the Venus Point mooring dolphin, was terminated October 5, 1909. During the fiscal year there was rehandled under this agreement 196,646 cubic yards of material, at a cost of 8 cents per cubic yard, place measurement in the cut.

The work of raising and strengthening the Cockspur Island and North Long Island training walls was continued, under contract of March 22, 1909, with Roderick G. Ross, of Jacksonville, Fla., until September 21, 1909, when the contract was completed. During the fiscal year 9,874.85 tons of stone were placed in the North Long Island training wall and 31,270.05 tons in the Cockspur Island training wall, a total of 41,144.90 tons. The total amount of stone placed in both training walls under the contract was 56,114.64 tons. The placing of this stone raised 6,000 feet of the Cockspur Island training wall to high water and 6,230 feet to 4 feet above low water, and 3,000 feet of the lower end of the North Long Island training wall to high water.

The mooring dolphin at The Bight, which had been damaged by the English steamer *Boliviana*, was repaired during February, 1910. Twenty piles were driven, 10 broken piles pulled out, 6,000 feet b. m. of new timber braces placed, and about 2,000 feet b. m. of old braces rebolted. One thousand dollars, which was collected from the owners of the steamer by the Department of Justice, was applied toward this work.

A reenforced concrete pile, 2 feet square and 53 feet long, was constructed and will be placed to mark the outer end of the Oyster Bed training wall.

Monthly surveys were made during the year to determine the amount of material handled where bin measurement was impracticable. A survey was made during December, 1909, of the outer bar. Tybee Roads and Tybee Knoll, and a complete survey of the harbor, from the upper limits of improvement to the sea, was made during April, May, and June, 1910.

The tide gauge observations have been maintained throughout the year and show no important change from previous conditions.

In addition to the above, the plant pertaining to the improvement has been cared for and properly maintained.

Of the total amount expended during the year, viz, $344,436.55, the sum of $66,395.81 was for dredging with the dredge *Morgan* at 7.3 cents per cubic yard in rehandling material, and for primary dredging with this dredge at 16.9 cents per cubic yard at the City front, 6 cents per cubic yard at Quarantine, and 5 cents per cubic yard at Obstructions channel, all including cost of repairs; $54,901.83 for dredging with United States seagoing dredge *Cumberland*, at 6.3 cents per cubic yard, including cost of repairs; $58,256.51 for dredging with United States seagoing dredge *Savannah*, at 6.9 cents per cubic yard, including cost of repairs; $19,975.76 for rehandling dredged material under open market agreement with Savannah Dredging Company, at 8 cents per cubic yard; $1,214.46 for repairs to mooring dolphin at The Bight; $905 for piling to mark dumping ground for seagoing dredges at Red Light; $110,320.29 for jetty work under contract of March 22, 1909, with Roderick G. Ross, at $2.07 per ton of 2,000 pounds of stone, in place; and $32,466.89 for office expenses, surveys, and contingencies.

COMMERCE AND NAVIGATION.

Full discussions of the commerce of Savannah were given in the Annual Reports of the Chief of Engineers for 1890, pages 1252–1253; for 1897, page 1497; and for 1909, pages 1327–1329.

The regular lines of steamships established between this port and New York, Boston, Baltimore, Philadelphia, and Jacksonville comprise a total of 15 steamers. During the calendar year 1909, 7 of these ran to the two first-named ports and 8 to the last-named three. During the year they made 322 round trips and carried 1,052,341 tons of freight, valued at $126,280,920. They also handled in and out of Savannah 37,634 passengers. At the close of the calendar year there were under construction two additional steamships of 6,200 tons each, which will be added to the coastwise fleet about July, 1910, to run between Savannah and New York.

A regular steamboat service is maintained on the Savannah River between Savannah and Augusta, Ga., a distance of 202 miles; a regular freight service is maintained between Savannah and the principal ports of the United Kingdom and continent of Europe; and in addition there is a fleet of American coastwise sailing vessels which operate between Savannah and Northern ports.

On the inland waters there are a number of small steamers plying between Savannah and adjacent ports, besides numerous schooners and small sailboats. It is estimated that for the year 1909 this portion of the commerce amounted to 100,000 tons, valued at $1.500,000.

The chief articles of export are cotton, lumber, and naval stores, of which shipments for the year 1909 were as follows: Of cotton, 1,508,208 bales; of lumber, 230,786,432 feet; and of naval stores, 189,734 barrels of turpentine and 681,658 barrels of rosin.

The total amount of freight received and shipped at the port during 1909 was 2,767,622 tons, valued at $186,701,147.

In collecting commercial statistics for this report, information has invariably been obtained from primary sources, and collections and tabulations made by committees or boards have not been adopted. This method prevents duplication, and, while it may give a result that is too small, it can not give inflated figures.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $400,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

Total of appropriations for improvement of Savannah Harbor to December 31, 1902 (taken from H. Doc. No. 421, 57th Cong., 2d sess., p. 250)		$6,459,563.58
Amount deposited by clerk of United States court		500.00
Other deposits to credit of appropriation		301.41
		6,460,364.99
Less unexpended balance of appropriation made by act of June 13, 1902, carried to new project		436,867.63
Total		6,023,497.36
Under the 28-foot plan of improvement the following appropriations have been made:		
By act of Congress of—		
June 13, 1902 (unexpended balance from last appropriation)		436,867.63
March 3, 1903		720,000.00
June 6, 1900 (allotted Aug. 28, 1903, from emergency appropriation)		5,000.00
April 28, 1904		105,000.00
March 3, 1905 (river and harbor act)	$75,000.00	
March 3, 1905 (sundry civil act)	175,000.00	
		250,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

Under the 28-foot plan of improvement the following appropriations have been made—Continued.		
September 28, 1905 (allotted from emergency appropriation)		$10,000.00
June 30, 1906 (sundry civil act)		150,000.00
March 4, 1907 (sundry civil act)		60,000.00
Total		1,736,867.63
Unexpended balance of last appropriation carried to new project		94,257.59
Total		1,642,610.04
Amounts received from proceeds of sale of government property:		
November 12, 1902	$75.00	
October 21, 1904	10.00	
November 6, 1906	474.10	
June 24, 1907	113.15	
		672.25
Total		1,643,282.29

Under the present plan of improvement, tentatively adopted March 2, 1907, and definitely adopted June 25, 1910, the following appropriations have been made:		
By act of Congress of—		
March 4, 1907 (unexpended balance from last appropriation)		94,257.59
March 2, 1907 (river and harbor act)		300,000.00
March 3, 1905 (allotted November 23, 1907, from emergency appropriation)		8,000.00
March 3, 1905 (allotted June 6, 1908, from emergency appropriation)		1,000.00
May 27, 1908 (sundry civil act)		300,000.00
March 4, 1909 (sundry civil act)		400,000.00
June 25, 1910 (river and harbor act)		400,000.00
Total		1,503,257.59
Amounts received from proceeds of sale of government property:		
February 18, 1908	$36.90	
May 7, 1909	57.38	
June 29, 1910	292.45	
		386.73
Amount received by officer in charge of construction of dredge		8.00
Amount received August 18, 1909, in settlement of claim of United States against steamship *Boliviana* for damage to mooring dolphin		1,000.00
Total		1,504,652.32
Grand total		9,171,431.97

CONTRACTS IN FORCE.

Name and address of contractor: Roderick G. Ross, Jacksonville, Fla.
Character and amount of work: Raising training walls; stone, 45,000 tons.
Rate: $2.07 per ton of 2,000 pounds, in place.
Date of approval: March 30, 1909.
Work begun: May 13, 1909.
Completed: September 21, 1909.

Name and address of contractor: Merrill-Stevens Company, Jacksonville, Fla.
Character of work: Docking and repairing U. S. seagoing dredge *Savannah*.
Amount of contract: $13,361.96.
Date of approval: Emergency; no approval required.
Work begun: January 3, 1910.
Expires: March 4, 1910.
Completed: February 16, 1910.

COMMERCIAL STATISTICS.

Cotton statistics of the port of Savannah, Ga., for the commercial year ending August 31, 1909, are as follows:

Receipts from all sources.

Grade.	Quantity.	Weight.	Value.
	Bales.	*Pounds.*	
Upland	1,467,201	744,575,163	$74,299,059
Sea island	53,806	20,984,340	4,349,677
Total	1,521,007	765,559,503	78,648,736

Destination.	Upland.	Sea island.
	Bales.	*Bales.*
Coastwise	544,492	42,519
Great Britain	166,341	4,883
France	88,805	2,422
Other continental ports	658,328	418
Local consumption	3,647	....
Reshipped to interior	4,363	2,580
Total	1,465,976	52,822

Total exports.

Grade.	Foreign exports.	Coastwise exports.	Total.
	Bales.	*Bales.*	*Bales.*
Upland	913,474	544,492	1,457,966
Sea island	7,723	42,519	50,242
Total	921,197	587,011	1,508,208

Total cotton receipts and exports at Savannah, season of 1908–9.

Receipts	bales	1,521,007
Exports	do	1,508,208

Total receipts and exports of naval stores at the port of Savannah, season of 1909–10.

Spirits of turpentine:		
Receipts	casks	173,246
Exports	do	189,734
Rosin:		
Receipts	barrels	618,545
Exports	do	681,658

Total exports of lumber from Savannah for season of 1908–9.

Superficial feet	230,786,432

Arrivals and clearances of vessels and commerce at Savannah, Ga., from January 1 to December 31, 1909.

[Does not include coastwise sailing vessels which are not required to enter and clear at the custom-house.]

	Arrived.			Cleared.		
	Number.	Tonnage.	Crew.	Number.	Tonnage.	Crew.
Coastwise	680	1,677,800	29,768	602	1,501,509	27,164
Foreign ports:						
American vessels	3	1,922	24	1	287	6
Foreign vessels	111	257,067	3,092	186	426,301	5,525
Total	794	1,936,789	32,884	789	1,928,097	32,695

Greatest draft:	Ft.	in.
Arrived	25	0
Cleared	25	10

Commerce (foreign).

Value of exports	$66,926,425.00
Value of imports	2,664,079.00
Duties collected	68,034.50

O 2.

IMPROVEMENT OF SAVANNAH RIVER, GEORGIA, BELOW AUGUSTA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Between August 3 and November 30, 1909, and between April 6 and May 31, 1910, the snag boat *Tugaloo* removed 2,734 snags and 150 stumps from the channel and cut 1,657 overhanging trees and 100 logs on the banks of the stream. Assistance was rendered by the snag boat for four days in raising the sunken river steamer *Katie*. The substitution of hoisting engines for the old steam capstans and general repairs to the snag boat, begun the latter part of the preceding fiscal year, were completed in July, 1909.

Under an open-market agreement with A. J. Twiggs & Son, of Augusta, Ga., a training wall 1,446 feet in length on the Georgia side of the river, and a shore-protection dike 1,112 feet in length on the South Carolina side, were constructed at Tweedys bar, and a training wall 1,573 feet in length constructed at Kirks bar. Work was begun August 20 and completed November 30, 1909. In this work 1,264 piles were driven and 11,022.59 cubic yards of brush fascines and 1,754.96 cubic yards of stone were placed.

On December 28, 1909, an allotment of $4,000 was made from the emergency appropriation for dike work at Canoe Cut bar. Under this allotment a training wall 600 feet in length was constructed on the South Carolina side of the river, and a shore-protection dike 400 feet in length built on the Georgia side, in which 363 piles were driven and 2,526.20 cubic yards of brush fascines and 410.67 cubic yards of stone were placed. This work was done under open-market agreement with A. J. Twiggs & Son, of Augusta, Ga., and was begun January 16 and completed March 20, 1909.

Of the amount expended during the fiscal year, viz, $33,780.73, the sum of $9,271.19 was for snagging operations with the U. S. snag boat *Tugaloo;* $4,434.28 for care and repair of plant; $18,577.96 for dike work under open-market agreements with A. J. Twiggs & Son, at $3 each for piling, 60 cents per cubic yard for brush fascines, and $2.50 per cubic yard for stone; $76.25 for traveling expenses in connection with inspections of material made for Isthmian Canal Commission (for which reimbursement is to be made); and $1,421.05 for office expenses and contingencies.

COMMERCE AND NAVIGATION.

A detailed statement of the sources of the commerce of this river is given on page 1331 of the Annual Report of the Chief of Engineers for 1890 and on page 1504 of the report for 1897.

During the calendar year 1909 there were 4 steamers engaged in river traffic between Savannah and Augusta, which carried a total of 33,615 tons of freight, valued at $5,325,250. There were also transported to Savannah from points on the river 1,785 tons of rice, valued at $59,674. The total commerce for the year amounted to 35,400 tons, valued at $5,384,924.

During the same year it is estimated that about 15,000,000 feet b. m. of timber was rafted down the river, valued at $150,000. Complete information concerning this portion of the commerce could not be obtained.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$90,000	
For maintenance of improvement	10,000	
		[a]$100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

The total of all appropriations for improvement of the Savannah River up to the adoption of the present project (taken from H. Doc. No. 421, 57th Cong., 2d sess., p. 250) amount to	$91,000.00
Unexpended balance from last appropriation carried to new project	19.91
Total	90,980.09
Received from other appropriations for use of snag boat	2,500.00
Total	93,480.09

Since the existing project for improving the Savannah River was adopted the following appropriations have been made for this work:

By act of Congress of—	
August 11, 1888 (balance unexpended)	19.91
September 19, 1890	25,000.00
July 13, 1892	35,000.00
August 18, 1894	15,000.00
June 3, 1896	15,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

Since the existing project for improving the Savannah River was adopted the following appropriations have been made for this work—Continued.

By act of Congress of—Continued.	
March 3, 1899	$20,000.00
June 6, 1900	64,000.00
March 3, 1901	100,000.00
June 28, 1902	86,000.00
April 28, 1904 (allotted November 11, 1904, from emergency appropriation)	5,000.00
March 3, 1905	13,000.00
March 3, 1905 (allotted November 24, 1906, from emergency appropriation)	2,000.00
March 2, 1907 (river and harbor act)	30,000.00
March 3, 1909 (allotted March 22, 1909, from emergency appropriation)	25,000.00
March 3, 1909 (allotted December 28, 1909, from emergency appropriation)	4,000.00
June 25, 1910 (river and harbor act)	70,000.00
Total	509,019.91
Amount received from "Proceeds of sale of government property" November 12, 1902	50.00
Amount received from "Proceeds of sale of government property" October 21, 1904	15.00
Amount received from "Proceeds of sale of government property" February 17, 1905	590.77
Total	509,675.68
Grand total	603,155.77

O 3.

IMPROVEMENT OF SAVANNAH RIVER, AT AUGUSTA, GEORGIA.

The improvement proposed is that of riprapping the river bank along the city front, at Augusta, to prevent erosion by freshets. The estimated cost of the work is $250,000, of which one-half is to be paid by the city of Augusta.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

No work was done, the project only having been adopted by act of Congress approved June 25, 1910.

COMMERCE AND NAVIGATION.

See report on Improvement of Savannah River, below Augusta, Ga. The total amount of that portion of the estimate to be borne by the Government having been appropriated, no estimate of additional funds required is submitted.

APPROPRIATION.

Act of June 25, 1910	$125,000

O 4.

IMPROVEMENT OF SAVANNAH RIVER, ABOVE ANGUSTA, GEORGIA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Between December 6, 1909, and January 15, 1910, a working party removed from the channel 14 snags and 20 bowlders, cut 268 overhanging trees and 31 logs on the banks, quarried 258 cubic yards of rock, and placed 276 cubic yards of rock in repairing existing dams. All of this work was done within the first 8 miles above the Augusta Locks.

During the fiscal year the sum of $863.25 was expended in the removal of rock and snags from the channel, and repairing regulating works.

A detailed statement of the commerce tributary to this river is given in a report on the examination and survey of the river, printed as House Document No. 213, Fifty-first Congress, first session.

The freight carried on the river consists of cotton, hay, grain, fertilizers, cord wood, and general merchandise. There are no established lines of boats. The freight is transported in flat boats or pole boats belonging to private individuals. It has been impossible to obtain anything like complete figures giving the commerce for the calendar year 1909, but it is probable that it did not differ greatly from the customary amount for the past eight years, which has averaged 2,995 tons, valued at $169,780.

Efforts to obtain complete information of the commerce for 1909 will be continued and if successful, the data will be forwarded to the Chief of Engineers in order that the report may be corrected accordingly.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $3,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

Total of all appropriations for the improvement of Savannah River above Augusta up to adoption of present project (taken from H. Doc. No. 421, 57th Cong., 2d sess., p. 250)	$39,000
Since the existing project for improving this portion of Savannah River was adopted the following appropriations have been made for this work:	
By act of Congress of—	
July 13, 1892	10,000
August 18, 1894	6,000
June 3, 1896	3,000
March 3, 1899	1,000
March 3, 1905	2,000
March 2, 1907	3,000
June 25, 1910	3,000
Total	28,000
Grand total	67,000

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[a] Exclusive of the balance unexpended July 1, 1910.

O 5.

IMPROVEMENT OF HARBOR AT DARIEN AND DOBOY BAR, GEORGIA.

Darien Harbor is constituted by that portion of Darien River between the town of Darien and Doboy Sound. Doboy bar constitutes the nearest ocean entrance to Darien Harbor and the Altamaha River. These two works were consolidated by the act of Congress approved June 13, 1902.

OPERATIONS DURING THE FISCAL YEAR ENDED JUNE 30, 1910.

No work was done, no funds being available.

COMMERCE AND NAVIGATION.

The commerce of Darien consists almost entirely of lumber and timber. A daily steamer runs to Brunswick. For about five months during the calendar year a freight boat made regular trips between Darien and Savannah. During the calendar year 1909 there was rafted down the Altamaha River and its tributaries, and from points along the Inside Waterway, to Darien, 60,423,000 feet of lumber and timber, valued at $855,925.

The foreign and domestic shipments consisted of a total of 44,150,000 feet of lumber and timber, valued at $640,650, and of this 32,113,000 feet was shipped from Sapelo, 13 miles north of Doboy bar, and 12,037,000 superficial feet, valued at $168,918, went over Doboy bar. The total amount rafted through Darien Harbor to Sapelo during the year was 30,000,000 feet, and to Savannah and Brunswick 28,560,000 feet.

The local freight handled at the port amounted to 4,000 tons, valued at $130,000.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.	

AMOUNT AND DATE OF ALL APPROPRIATIONS.

There was appropriated for Darien Harbor, to June 18, 1878 (as shown by H. Doc. No. 421, 57th Cong., 2d sess., p. 249)	$8,000.00
Since the existing project for improving this work was adopted the following appropriations have been made:	
September 19, 1890	25,000.00
July 13, 1892	25,000.00
August 18, 1894	25,000.00
June 3, 1896	20,000.00
March 3, 1899	10,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

Since the existing project for improving this work was adopted the following appropriations have been made—Continued.

From the appropriation of $30,000, Darien Harbor and Doboy bar, June 13, 1902, there was allotted November 7, 1902	$24,000.00
Amount allotted November 23, 1904	26,865.96
June 25, 1910 (river and harbor act)	10,000.00
Total	165,865.96
Amount received from appropriation for Cumberland Sound, Georgia and Florida	1,500.00
Total	167,365.96
Grand total	175,365.96

The total amount appropriated for Doboy bar previous to the existing project was $5,795.40 (as taken from H. Ex. Doc. 421, 57th Cong., 2d sess., p. 248; $5,795.40 of $10,000 appropriated for Altamaha River, Ga., by act of Aug. 5, 1886, p. 151, same document).

Since the existing project for this work was adopted the following appropriation was made:

March 3, 1899	70,000.00
Unexpended balance carried to consolidated appropriation for improving harbor at Darien and Doboy bar	50,865.96
Total	19,134.04
Amount allotted December 23, 1903	2,000.00
Amount allotted November 23, 1904	28,000.00
Total	49,134.04
Grand total	54,929.44
Aggregate of appropriations for Darien Harbor and Doboy bar	230,295.40

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Darien, Ga., from January 1 to December 31, 1909.

	Arrived.			Cleared.		
	Number.	Tonnage.	Crew.	Number.	Tonnage.	Crew.
Coastwise	30	30,274	473	16	7,962	123
Foreign ports:						
American vessels	2	1,209	15	....	....	....
Foreign vessels	1	1,447	18	18	28.366	404
Total	33	32,930	506	34	36,328	527

Timber shipments from port of Darien, Ga., from January 1 to December 31, 1909.

	Superficial feet.	Value.
Foreign	30,649,263	$395,464
Coastwise	5,105,776	107.500
Total	35,755,039	502,964

O 6.

IMPROVEMENT OF SAPELO HARBOR, GEORGIA.

Sapelo Sound is a wide and deep body of water. There is no town or commercial harbor situated upon it. Upon Front River, a deep tidal creek emptying into the Sound, there are certain docks and mooring places made use of for the shipment of lumber and timber. The larger class of vessels have difficulty in reaching these landing places, and the proposed improvement has for its object the removal of the first two shoals in the river by the excavation of 100,000 cubic yards of material, at an estimated cost of $21,000. The project of improvement will be found printed in House Document No. 561, Sixty-first Congress, second session. It was adopted by the act of Congress approved June 25, 1910, which appropriated $10,000 toward carrying out the improvement.

No work was done during the fiscal year, no funds being available.

COMMERCE AND NAVIGATION.

During the calendar year 1909, 32,113,000 feet b. m. of lumber and timber, valued at $401,412, was shipped from the wharves situated along Front River.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$11,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATION.

Act of June 25, 1910	$10,000

O 7.

IMPROVEMENT OF ALTAMAHA, OCONEE, AND OCMULGEE RIVERS, GEORGIA.

(A) ALTAHAMA RIVER.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Eleven hundred and nine snags, and 95 stumps were removed from the channel, 505 overhanging trees were cut from the banks, and 10 large trees were girdled.

Eight hundred and ninety-five cubic yards of stone were removed from Town Bluff shoals and 728 cubic yards from Hell shoals.

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[a] Exclusive of the balance unexpended July 1, 1910.

A log float was raised and removed from the channel at Doctortown. The steamer *Wilmington*, operating between Darien and Doctortown, sunk in the channel at Millers Lake. Assistance was rendered in raising the steamboat, it being more advantageous to assist the owners in this work than for the Government to have to take the vessel out entirely as a wreck, since in the position in which it sank it seriously blocked navigation and would have been a total wreck if help had not been rendered.

Of the amount expended during the fiscal year, viz, $10,893.14, the sum of $5,000 was for snagging, $3,893.14 for removal of rock shoals, $600 for raising sunken river steamer *Wilmington* and an old log float, and $1,400 for surveys and contingencies.

COMMERCE AND NAVIGATION.

The chief articles transported were naval stores, hard wood, timber, and general merchandise. Large quantities of timber and lumber were rafted to Darien.

Two freight steamers operating between Macon and Brunswick passed over the entire length of the Altamaha River for three months during the calendar year. In April, 1909, one of these sank, and operations by the Macon and Brunswick Navigation Company, the owners, were suspended.

Three other steamers operated between various points on the river.

During the calendar year 1909, 50,424,000 feet of timber and lumber was rafted down the river, valued at $747,125. The majority of this timber came from the Oconee and Ocmulgee rivers and was rafted down the Altamaha River to Darien, Ga.; 19,000,000 feet originated on the Altamaha River.

There was also handled 41,000 tons of freight, valued at $2,295,000.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

The total appropriations for the improvement of the Altamaha River up to the adoption of the existing project, and including the act of August 11, 1888 (taken from H. Doc. No. 421, 57th Cong., 2d sess., p. 248), amounts to	$65,000.00
Unexpended balance of last appropriation carried to new project	223.41
Total	64,776.59

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[a] Exclusive of the balance unexpended July 1, 1910.

Since the existing project for improving Altamaha River was adopted, in 1890, the following appropriations have been made for this work:

By act of Congress of—	
August 11, 1888 (unexpended balance)	$223.41
September 19, 1890	15,000.00
July 13, 1892	15,000.00
August 18, 1894	10,000.00
June 3, 1896	10,000.00
March 3, 1899	6,000.00
June 6, 1900 (allotted July 9, 1900, from emergency appropriation)	2,000.00
June 6, 1900 (allotted Sept. 14, 1900, from emergency appropriation)	7,000.00
June 13, 1902	10,000.00
March 3, 1905	10,000.00
March 2, 1907 (amount allotted Apr. 24, 1907, from appropriation for Altamaha, Oconee, and Ocmulgee rivers)	17,000.00
March 3, 1909 (amount allotted Apr. 7, 1909, from emergency appropriation)	10,000.00
June 25, 1910 (amount allotted from appropriation for Altamaha, Oconee, and Ocmulgee rivers)	20,000.00
Total	132,223.41
November 30, received from sale of government property	111.50
Total	132,334.91
Grand total	197,111.50

(B) OCONEE RIVER.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Two thousand and sixteen snags and 164 stumps were removed from the channel, 3,165 overhanging trees and saplings and 64 logs cut from the banks, and 106 large trees girdled.

One hundred and ninety-seven cubic yards of stone were removed from Quinn's shoals, 447 cubic yards from Devils Elbow, 741 cubic yards from Guyton Bluff, and 75 cubic yards from Hobbs's Boatyard shoals.

Fifteen hundred and thirty cubic yards of earth were removed from a shoal at Bryant's floating mill and 540 cubic yards of clay and soft stone were removed from shoals at Cheneys Ferry.

Five hundred and three cubic yards of brush and 22 cubic yards of stone were placed in the training wall at McLeods Cut. Five hundred and forty-nine cubic yards of brush and 75 cubic yards of stone were placed in the training wall at Bonny Clabber and 54 cross-ties were attached to the piling.

All work done was between The Forks and a point 20 miles above Dublin. No work was done between the Georgia Railway bridge, 54 miles above Milledgeville, and the northern boundary of Greene County.

Of the total amount expended during the fiscal year, viz, $15,526.13, the sum of $4,526.13 was for rock removal, $6,000 for snagging, $900 for dike work, $1,500 for dredging, $800 for repair and construction of plant, and $1,800 for contingencies.

COMMERCE AND NAVIGATION.

During the calendar year 1909 four steamers operated on various portions of the river between The Forks and a point 20 miles above Dublin. Twenty thousand three hundred and forty-five tons of freight, valued at $731,000, were handled.

In addition to the above, there was rafted down the river during the year 20,575,000 feet of timber and lumber, valued at $307,625.

The character of the freight transported was cotton, cotton-seed meal, guano, merchandise, and hard wood.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

The total of appropriations for the improvement of the Oconee River, up to the adoption of the present project (as taken from H. Doc. No. 421, 57th Cong., 2d sess., p. 249), amount to	$45,000.00
Unexpended balance from last appropriation carried to new project	177.82
Total	44,822.18

Since the existing project for improving the Oconee River was adopted the following appropriations have been made for this work:	
By act of Congress of—	
August 11, 1888 (unexpended balance)	177.82
September 19, 1890	25,000.00
July 13, 1892	25,000.00
August 18, 1894	10,000.00
June 3, 1896	10,000.00
March 3, 1899	10,000.00
June 6, 1900 (allotted July 9, 1900, from emergency appropriation)	2,000.00
June 6, 1900 (allotted Mar. 22, 1901, from emergency appropriation)	800.00
June 6, 1900 (allotted June 19, 1901, from emergency appropriation)	300.00
June 6, 1900 (allotted July 11, 1901, from emergency appropriation)	650.00
June 13, 1902	25,000.00
March 3, 1905	15,000.00
March 2, 1907 (allotted Apr. 27, 1907, from appropriation for Altamaha, Oconee, and Ocmulgee rivers)	29,000.00
March 3, 1909 (allotted Apr. 7, 1909, from emergency appropriation)	15,000.00
June 25, 1910 (allotted from appropriation for Altamaha, Oconee, and Ocmulgee rivers)	30,000.00
Total	197,927.82

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[a] Exclusive of the balance unexpended July 1, 1910.

Amounts received from proceeds of sale of government property:	
October 26, 1903	$43.00
October 21, 1904	15.00
February 17, 1905	590.77
June 27, 1910	20.50
Total	198,597.09
Grand total	243,419.27

(c) OCMULGEE RIVER.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Between Macon and Hawkinsville: Fifty-three snags were removed from the channel and 19 overhanging trees cut from the banks. Between Macon and a point 5 miles below, 1,508 linear feet of shore protection and 757 linear feet of training wall was constructed at various points. Four thousand two hundred and ninety-nine linear feet of old training dike was raised. In this work 604 piles were driven and 7,739 cubic yards of brush and 803 cubic yards of stone were placed. Of the stone placed 193 cubic yards were rehandled from the crest of the old work.

One thousand eight hundred and fourteen cubic yards of stone were removed from Tanyard shoals; 285 cubic yards from Taylors Bluff shoals; 75 cubic yards from Buttermilk shoals; 80 cubic yards from Town shoals; and 299 cubic yards from various places between Hawkinsville and a point 6 miles above. Four hundred and forty-eight cubic yards of clay were also removed from Tanyard shoals.

Between Hawkinsville and The Forks: Three hundred and four snags and 24 stumps were removed from the channel; 1,574 overhanging trees were cut from the banks and 8 large trees girdled. Three hundred and ninety-four cubic yards of stone were removed from Seven Sycamore shoals; 195 cubic yards from Gradys shoals; 187 cubic yards from Ways shoals; and 224 cubic yards from various points between Hawkinsville and a point 30 miles below. Two hundred and fifty-three cubic yards of clay were dredged from Seven Sycamore shoals.

One thousand one hundred and nine cubic yards of brush and 108 cubic yards of stone were placed in the training wall at Davis Reach.

A deflecting dam, 190 feet long, and a training dike, 275 feet long, were constructed at Taylors Bluff shoals, to deflect the flow through the dredged channel at this point. For this work 299 cubic yards of stone was used which had been blasted and dredged from the shoals near by.

The old hull of the steamer *John L. Day*, sunk several years ago in the vicinity of Lumber City, was removed from the channel.

Two temporary barges—one 58 by 15 by 2 feet and the other 40 by 16 by 3 feet—with a lightly framed house on each, were constructed and put in use, temporarily, as quarter boats for survey parties. After they have served this purpose the houses are to be removed and the hulls, if still serviceable, used as barges for the handling of material for construction works.

All floating plant pertaining to the improvement of the three rivers was cared for and properly maintained.

Of the total amount expended during the fiscal year, viz, $12,182.80, the sum of $800 was for snagging, $4,067.20 for construction of training walls and shore protection dikes, $2,432.80 for raising and repairing training walls, $3,632.80 for removal of rock shoals, $300 for dredging, $100 for raising hull of sunken steamer *John L. Day*, and $850 for surveys and contingencies.

COMMERCE AND NAVIGATION.

A detailed discussion of this subject will be found on pages 1478 to 1484 of the Report of the Chief of Engineers for 1890 and page 1520 of the same report for 1897.

Five steamers operated on this river between The Forks and Macon, and of these, two steamers were operated between Macon and Brunswick during three months of the year.

During the calendar year 1909 the steamers plying the river handled 17,400 tons of freight, valued at $990,000. There was, in addition to this, rafted on the river 26,460,000 b. m. feet of timber and lumber, valued at $225,800.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

The total appropriations for the improvement of the Ocmulgee River up to the adoption of the present project (taken from H. Doc. No. 421, 57th Cong., 2d sess., p. 249) amount to	$79,500.00
Unexpended balance carried forward from last appropriation to new project	109.27
Total	79,390.73

Since the existing project for improving Ocmulgee River was adopted the following appropriations have been made for the work:

By act of Congress of—	
August 11, 1888 (unexpended balance)	109.27
September 19, 1890	30,000.00
July 13, 1892	25,000.00
August 18, 1894	10,000.00
June 3, 1896	10,000.00
March 3, 1899	20,000.00
June 6, 1900	40,000.00
March 3, 1901	40,000.00
June 28, 1902	56,000.00
March 3, 1905	15,000.00
March 2, 1907 (allotted Apr. 27, 1907, from appropriation for Altamaha, Oconee, and Ocmulgee rivers)	29,000.00
March 3, 1909 (allotted Apr. 7, 1909, from emergency appropriation)	15,000.00
June 25, 1910 (allotted from appropriation for Altamaha, Oconee, and Ocmulgee rivers)	40,000.00
Total	330,109.27

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[a] Exclusive of the balance unexpended July 1, 1910.

Amounts received from proceeds of sale of government property:	
November 12, 1902	$106.00
October 28, 1903	43.00
February 17, 1905	590.76
February 21, 1908	62.50
Total	330,911.53
Grand total	410,302.26

O 8.

IMPROVEMENT OF CLUB AND PLANTATION CREEKS, GEORGIA.

No work of improvement has yet been done.

No provision was made in the project for improvement, or in the act which adopted the project for the purchase of a right of way for the canal to connect the two creeks and the necessary cut-offs to straighten Plantation Creek. The desired right of way crosses marsh land owned by the city of Brunswick and certain nonresident parties. During the preceding fiscal year a quit-claim deed was secured from the city of Brunswick, free of cost, for that portion of the right of way which crossed its land. Negotiations with the other landowners were carried on for over a year and finally resulted in securing, without cost, during August and September, 1909, conveyances granting easements for the desired dredging through their lands. All conveyances were held by the department to be sufficient for the purpose of the Government, and commencement of the work of improvement was authorized. The documents were duly recorded in the office of the clerk of the superior court of Glynn County, Ga.

Bids for carrying forward the proposed improvement as far as the funds available would permit were opened March 9, 1910. The lowest bid received was 15½ cents per cubic yard, but was not accepted because of the fact that the bidder had no plant, and that which he proposed to build for the work was deemed entirely unsuitable and unsatisfactory. All bids were rejected, and it was decided that it would be to the best interest of the Government to await the appropriation of the balance of the original estimate and then call for new bids for carrying out the entire work. The river and harbor act approved June 25, 1910, appropriated $20,700 for completing the improvement.

APPROPRIATIONS.

March 2, 1907	$20,000
June 25, 1910	20,700
Total	40,700

O 9.

IMPROVEMENT OF BRUNSWICK HARBOR, GEORGIA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Dredging operations were continued under contract with the Coastwise Dredging Company, dated September 21, 1907, for lot No. 2, Brunswick inner harbor, and lot No. 3, Brunswick outer bar. During the year there was removed 60,119.2 cubic yards of material from the shoal opposite Brunswick Point and 210,752.8 cubic yards from the outer bar.

All dredging provided for at Brunswick Point was completed November 15, 1909, a total of 184,540.1 cubic yards of material having been removed. The work on the bar was completed on November 23, 1909, a total of 1,380,819.3 cubic yards having been removed.

A complete cross-section survey was made of the dredged channel at Brunswick Point and across the bar upon the completion of the contract and a comparison made of the amount of material removed by bin and place measurement. Previous to the completion of the work many examinations were made of the dredged channels in order to make the necessary monthly estimates and also to see that the full project depth was obtained.

Cross-section surveys were made of portions of Turtle River and East River, where the project depth had not been obtained, due to the existence of refractory material, and a survey was made of Academy Creek.

Bids were opened March 21, 1910, for the removal of about 23,100 cubic yards of refractory material from the inner harbor, and contract was entered into on April 1, 1910, with P. Sanford Ross (Incorporated), of Jersey City, N. J., at $2.80 per cubic yard, place measurement. The contract was approved April 22, 1910, and under its terms work was to have been begun June 26, 1910, but by authority of the Chief of Engineers this date was waived for a reasonable period.

The automatic tide gauge was kept in operation during the month of July, 1909, and the readings of the high and low waters for the total period that this gauge was in operation, viz, between April, 1908, and July, 1909, were tabulated and the result of the determinations show that the rise and fall of the tide in East River, at the lower end of the city, is 7.05 feet and the elevation of the low water at Brunswick is the same as at Ocean Pier, St. Simons Island.

The suboffice at Brunswick, Ga., was maintained and the survey launches kept in repair.

Condition of work June 30, 1910: The full project depth and width was obtained upon the bar at the completion of the work on November 23, 1909. Since then very little shoaling has taken place. The controlling depth upon the center line is 30 feet at mean high water and the average depth over the dredged area is approximately 31 feet. At one place, upon the south side of the channel, just beyond the crest of the bar, some shoaling has taken place for a linear length of approximately 4,000 feet, and this shoal has encroached upon the channel about 100 feet. Only 7 per cent of the entire area dredged has a depth of less than that required by the project, and over this area there has been an average decrease in depth of 1 foot.

A comparison between bin and place measurement of the amount of material removed from the bar shows a difference of 510,372.6 cubic yards. The total amount dredged, by bin measurement, including the amount deducted for material dredged off range, was 1,388,384.8 cubic yards. By place measurement the total amount of material removed was 1,898,757.4 cubic yards. The above shows that the quantity removed as determined by place measurement was 36.7 per cent greater than the amount retained in the bins.

The general character of the material removed from the bar was 55 per cent sand, 5 per cent shell, 24 per cent clay or stiff mud, and 16 per cent mud.

A recent examination of Brunswick Point shows that no shoaling has taken place at this locality since the completion of the contract in November, 1909.

Very little shoaling has occurred in East River and the controlling depth upon the center line is 30.5 feet at mean high water. At the lower end of the harbor, for a distance of approximately 2,500 feet, some shoaling has taken place on the sides, mostly due to caving in of the steep banks that existed upon the completion of the work. Two small areas, composed of refractory material, exist on the eastern edge of the channel, and will require the removal of about 3,900 cubic yards. This work is now under contract.

The condition of the channel in Turtle River remains the same as it was upon the completion of the dredging, there remaining a number of lumps of refractory material to be removed.

After the completion of the existing (Ross) contract there will still remain some of this hard material (estimated at 12,000 yards in place) to be removed from the lower shoal in Turtle River. As this work can not be done with funds provided for maintenance, a specific appropriation should be had for its accomplishment; the estimated cost is $40,000.

There was included in the original estimate for this project an item of $30,000 for jetty work as an aid in maintaining the channels. These jetties have not been constructed, and the necessity for them has not yet been demonstrated.

Of the total amount expended during the fiscal year, viz, $98,340.50, the sum of $87,861.04 was for dredging channels through the shoal opposite Brunswick Point and across the outer bar, under contract of September 21, 1907, with Coastwise Dredging Company, at 16.5 and 23 cents per cubic yard, respectively, and $3,997.79 for surveys and contingencies.

COMMERCE AND NAVIGATION.

Information in regard to the commerce of Brunswick before the improvement will be found on page 1523 of the Report of the Chief of Engineers for 1897.

The chief articles of export are cotton, lumber, cross-ties, and naval stores, of which the shipments for the calendar year 1909 were as follows: Of cotton, 307,797 bales; of lumber and cross-ties, 118,345,000 feet b. m.; and of naval stores, 43,063 barrels of turpentine and 136,955 barrels of rosin.

Two regular lines of steamships made use of this port during 1909. The Clyde Line operated between Brunswick and Boston and the Brunswick Steamship Company ("Bee Line") between New York and Brunswick. During 1909 they made 187 round trips and carried 314,000 tons of freight.

On the inland waters there are a number of small steamers plying between Brunswick and adjacent ports, besides numerous schooners, small sailboats, and tugs and gasoline launches towing barges.

During the calendar year 1909 this portion of the commerce amounted to 59,000 tons, valued at $1,741,500.

The total amount of freight received and shipped at the port during 1909 was 774,000 tons, valued at $43,129,000.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $50,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

Since the work of improvement was begun there has been appropriated—

Up to December 31, 1902, as shown by House Document No. 421, Fifty-seventh Congress, second session, page 248, the sum of	$670,000.00
March 3, 1905	40,000.00
Total	710,000.00
Unexpended balance of last appropriation carried to new project	12,120.75
Total	697,879.25

Under the project providing for channels 30 feet in depth at mean high water the following appropriations have been made:

By act of Congress of—	
March 3, 1905 (unexpended balance from last appropriation)	$12,120.75
March 2, 1907 (river and harbor act)	146,650.00
May 27, 1908 (sundry civil act)	303,000.00
March 4, 1909 (sundry civil act)	47,000.00
June 25, 1910 (river and harbor act)	50,000.00
Total	558,770.75
Grand total	1,256,650.00

CONTRACTS IN FORCE.

Name and address of contractor: P. Sanford Ross (Incorporated), Jersey City, N. J.

Character and amount of work: Dredging refractory material, 23,100 cubic yards.

Rate: $2.80 per cubic yard, place measurement.

Date of approval: April 22, 1910.

Work begun: Not yet begun.

Expires: December 26, 1910.

Name and address of contractor: Coastwise Dredging Company, Norfolk, Va.

Character and amount of work: Dredging, lots Nos. 2 and 3, 230,000 and 1,500,000 cubic yards, respectively.

Rate: Lot No. 2, 16½ cents per cubic yard; lot No. 3, 23 cents per cubic yard, place measurement.

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[a] Exclusive of the balance unexpended July 1, 1910.

Date of approval: October 5, 1907.
Work begun: Lot No. 2, January 9, 1908; lot No. 3, January 10, 1908.
Expires: August 29, 1909.
Completed: Lot No. 2, November 15, 1909; lot No. 3, November 23, 1909; date originally fixed for completion waived.

COMMERCIAL STATISTICS.

Commerce (coastwise, local, and foreign), 1909.

Value of exports:	
Coastwise	$8,833,831
Foreign	17,098.293
Value of imports	15,455,981
Value of local freight handled	1,741,500
Total	43,129,605

Statement of receipts of naval stores, 1909.

Rosin	barrels	164,823
Spirits	do	47,403

Arrivals and clearances of vessels at Brunswick, Ga., 1909.

	Arrived.			Cleared.		
	Number.	Tonnage.	Crew.	Number.	Tonnage.	Crew.
Coastwise	392	552,117	6,461	357	469,278	5,350
Foreign ports:						
American vessels	8	4,820	63			
Foreign vessels	42	35,007	622	81	110,068	1,621
Total	442	591,944	7,146	438	579,346	6,971

Greatest draft cleared, 25.2 feet.

O 10.

IMPROVEMENT OF INSIDE WATER ROUTE BETWEEN SAVANNAH, GEORGIA, AND FERNANDINA, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

The contract entered into on January 5, 1909, with Simons-Mayrant Company, of Charleston, S. C., for dredging at various localities was completed on July 19, 1909. During the fiscal year 5,667 cubic yards was removed under the contract from the shoal in Frederica River. Under open-market agreement with the same contractor 500 additional cubic yards were removed from this shoal. The total amount removed under the contract was 94,068.6 cubic yards.

The extension of the oyster-shell training wall in Jekyl Creek was commenced June 9, 1909, and the work was completed August 14, 1909. The total amount of shell placed was 37,393.7 bushels, of which 29,799.7 bushels were placed in the work during the fiscal year. This training wall was extended 1,000 feet and the elevation of the crest was brought up to 4½ feet above mean low water. In order to better control the flow through Jekyl Creek, a closing dam was placed in Mud Creek, which enters Jekyl Creek back of the oyster-shell training wall, a total of 26,881.6 bushels of shell, with 182.94 cubic yards of stone, being placed in the dam. The crest of this dam was brought up to mean low water.

A contract, dated July 23, 1909, was entered into with the Blackstaff Engineering Company, of Philadelphia, Pa., to raise the stone jetty at the entrance to Jekyl Creek to mean high water. The date originally set for commencement of work, viz, October 14, 1909, was waived for a reasonable period. The work was commenced November 10, 1909, and up to the close of the fiscal year 2,869.74 tons of stone had been placed, which raised 800 feet of the jetty to mean high water.

This contract expired, under its terms, on November 30, 1909, but under authority of the Chief of Engineers the contractors have been permitted to continue work under an implied waiver under the law as stated in VIII Comptroller's Decisions, 104.

A cluster of four piling was driven to mark the outer end of the jetty at the entrance to Jekyl Creek, Georgia.

Examinations were made of the dredged channels at Cumberland Dividings, Jekyl Creek, Frederica River, Little Mud River, and Mud River.

Of the total amount expended during the fiscal year, viz, $16,565.80, the sum of $3,820.95 was for dredging under contract of January 5, 1909, with Simons-Mayrant Company, at 17.9 cents per cubic yard, and $96.76 for dredging by the same company under open-market agreement; $1,458.35 for extending the existing training wall near the head of Jekyl Creek by P. N. Strong, under circular letter of May 21, 1909, at $0.039 per bushel of oyster shells in place; $1,560.62 for construction of cut-off dam at mouth of Mud Creek, under open-market agreement, at $0.039 per bushel of oyster shells in place; $6,173.19 for raising jetty at the mouth of Jekyl Creek under contract of July 23, 1909, with the Blackstaff Engineering Company, at $2.60 per ton of stone in place; and $3,455.93 for surveys, office expenses, and contingencies.

The original estimate for the improvement of this route was completed with the appropriation of $41,000 made by the river and harbor act of March 3, 1905, but the improvement was still unfinished. The reasons for this are set forth in a report of the district officer, printed on page 1208 of the Annual Report of the Chief of Engineers for 1906.

Report of a resurvey of the waterway to determine the best route for further improvement, with estimate of cost, as provided for by the river and harbor act of March 2, 1907, will be found printed as House Executive Document No. 1236, Sixtieth Congress, second session. This project has not yet been adopted by Congress.

COMMERCE AND NAVIGATION.

The commerce over this route is quite varied. Eight combined freight and passenger steamers run from Brunswick and Fernandina to local points. A large number of barges, towed by gasoline and steam launches, bring naval stores, cross-ties, lumber, and miscellaneous freight from various landings to Fernandina, Brunswick, and Savannah for shipment.

Considerable freight is transported from Brunswick over the Altamaha River system, which passes over a portion of this route.

A large quantity of timber and lumber is rafted from Darien to Savannah and Brunswick, and from other points to Fernandina, Savannah, and Brunswick for shipment.

During the calendar year 1909 one boat operated over the entire route for a period of five months. Thirty-seven vessels were towed through Jekyl Creek from St. Simons Sound to the Satilla River.

Some 50 or 60 pleasure yachts, varying from 5 to 100 tons register, passed over the route to and from the North.

During the calendar year 1909 there was carried over the entire route, or portions of same, 54,007 tons of freight, valued at $2,067,998.

In addition to the above there was towed in rafts 70,573,000 feet of timber and lumber, valued at $1,008,500.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS.

The total of appropriations made for the improvement of Parsons Cut, of Romerly Marsh, and Jekyl Creek, Georgia, as shown by House Document No. 421, Fifty-seventh Congress, second session, pages 249 and 250, amount to $71,108.77.

Since the existing project for improving the inside route was adopted, appropriations have been made as follows:

Act of Congress approved—	
July 13, 1892	$15,000.00
August 18, 1894	20,000.00
June 3, 1896	14,000.00
June 13, 1902	15,000.00
March 3, 1905	41,000.00
March 2, 1907	30,000.00
March 3, 1909 (allotted Mar. 24, 1909, from emergency appropriation)	25,000.00
June 25, 1910 (river and harbor act)	12,500.00
Total	172,500.00
Grand total	243,608.77

CONTRACTS IN FORCE.

Name and address of contractor: Simons-Mayrant Company, Charleston, S. C.
Character and amount of work: Dredging, 100,000 cubic yards, place measurement.
Rate: 17.9 cents per cubic yard, place measurement.
Date of approval: January 15, 1909.
Work begun: January 25, 1909.
Expires: July 19, 1909.
Completed July 19, 1909.

Name and address of contractor: Blackstaff Engineering Company, Philadelphia, Pa.
Character and amount of work: Furnishing and placing 6,000 tons of stone for raising jetty at mouth of Jekyl Creek.
Rate: $2.60 per ton of 2,000 pounds.
Date of approval: August 25, 1909.
Work begun: November 10, 1909 (date originally set, October 14, 1909, waived).
Expires: November 30, 1909 (waived; no specific date fixed).

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[a] Exclusive of the balance unexpended July 1, 1910.

O 11.

IMPROVEMENT OF SKIDAWAY NARROWS, GEORGIA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

No work was done.

The project was completed November 20, 1908.

Skidaway Narrows is now an integral part of the inside water route between Savannah and Fernandina. All vessels passing southward from Savannah by the inside route now go through Skidaway Narrows. There is no reason for preserving it as a separate work. It should be treated simply as a part of the inside route, and was so considered in the report of the survey of that route called for by the act of Congress of March 2, 1907, and published in House Document No. 1236, Sixtieth Congress, second session. For this reason no separate estimate is submitted for the improvement or maintenance of Swidaway Narrows as a separate work.

No funds were expended and none were available during the fiscal year.

COMMERCE AND NAVIGATION.

Included in commerce of inside water route between Savannah, Ga., and Fernandina, Fla. (See Appendix O 8.)

APPROPRIATIONS.

March 3, 1905	$20,000
March 2, 1907	35,000
Total	55,000

O 12.

IMPROVEMENT OF HARBOR AT FERNANDINA, FLORIDA.

Cumberland Sound, Georgia and Florida, constitutes the ocean entrance to Fernandina Harbor. These two works of improvement were consolidated by the act of Congress approved June 25, 1910.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

(*a*) Fernandina Harbor: No work was done other than the making of a survey of the dredged channel and plotting the results.

(*b*) Cumberland Sound: Work was begun November 30, 1909, under contract with R. G. Ross, of Jacksonville, Fla., dated November 3, 1909, for repairing the jetties. All work called for under the contract was satisfactorily completed January 22, 1910. A total of 8,298.6 tons of stone was placed in the work, of which 8,095.6 tons was placed on the north jetty and 203 tons on the south jetty. The work accomplished under the contract was the filling in of the low places in the north jetty, from station 10,000 to station 19,000, and the filling in of one gap near the inner end of the south jetty.

A complete survey of the entrance was made in April, 1910, and the results plotted.

All work done during the fiscal year was for maintenance of the improvement.

Condition of work on June 30, 1910: The general condition of the improvement is excellent. The progressive seaward movement of the sand shoals between and beyond the jetties during the year was in the same ratio as for the preceding year. The inner ends of the jetties are well sanded up.

The beach in front of the dike on Cumberland Island continues to enlarge. Its width above high-water mark, opposite the old break, is now 850 feet. The dredged cut-off in Beach Creek diverts practically all the flow from inside the dike at the old break.

The controlling depth between the jetties, on the established range, now marked by range lights recently constructed by the Light-House Department, is 24 feet at mean low water, and on this line the controlling depth over the outer shoal, near the bell buoy, is 23.2 feet. By slightly changing the sailing course, 2 feet can be added to the navigable depth. A small shoal, 400 feet long, is found inside the jetties, close to the center range and to the south of it, which has a depth of but 18 feet, but on the opposite side of the range at this point there is a clear channel of good width and with an excess depth.

The channel on the south side of the entrance still continues to deepen and now has a controlling depth of 24 feet, but this channel can not be readily navigated as two or three turns would have to be made and no ranges have been established.

The extensive shoal beyond the ends of the jetties, which for several years has remained unbroken, is now divided into two parts, with a channel between the two portions having a depth of 24 feet.

The southern portion has progressed seaward during the past year some 500 feet. The general depth upon the crest is 3 feet greater at this time than it was a year ago. The movement of the portion of the shoal on the north has not been as marked, but considerable erosion has taken place during the past year on the inner face of same. The general depth upon the crest remains the same as last year.

The jetties are in good condition. In places they need raising 2 or 3 feet in order to keep their crest at an elevation of mean high water. There is a tendency for an increased flow around the south end of Cumberland Island, and this current makes over to the north jetty and follows it to deep water at the angle point. As yet this increased flow has had no injurious effect upon the improvement, but should be watched, as an incipient channel forming alongside the jetty might produce scouring and cause undermining of a portion of the jetty, which rests on the sand bottom at or a little below low-water depth in this section.

The total amount expended during the fiscal year for Fernandina Harbor, viz, $655.50, was for surveys and contingencies.

Of the total amount expended during the fiscal year for Cumberland Sound, viz, $28,076.18, $22,811.15 was for repairs to jetties under contract of November 3, 1909, with Roderick G. Ross, at $2.74 per ton of stone in place, and $5,265.03 for office expenses, surveys, and contingencies.

COMMERCE AND NAVIGATION.

Including the commerce of St. Marys, Ga., which amounted to 30,000 tons, valued at $300,000, the total commerce of the harbor of Fernandina during the calendar year 1909 amounted to 582,000 tons, with a value of $11,065,000. The chief articles of export are lumber, phosphate rock, and naval stores, of which the shipments for the year 1909 were as follows: Lumber, 104,031,000 feet b. m.; phosphate rock, 100,400 tons; rosin, 274,000 barrels; and turpentine, 77,400 barrels. The details of this commerce are given in the tables appended hereto.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $25,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

AMOUNT AND DATE OF ALL APPROPRIATIONS FOR FERNANDINA HARBOR.

By act of Congress of—	
March 2, 1907 (river and harbor act)	$115,000.00
June 25, 1910 (river and harbor act)	45,000.00
June 30, 1910, unexpended balance carried from Improving Cumberland Sound, Georgia and Florida, these two works having been consolidated by the river and harbor act of June 25, 1910 (to be reallotted)	6,987.19
Total	166,987.19

AMOUNT AND DATE OF ALL APPROPRIATIONS FOR CUMBERLAND SOUND.

The total appropriations, as given by House Document No. 421, Fifty-seventh Congress, second session, pages 339 and 340, amount to $932,500.

Under the existing project of improvement the following appropriations have been made:

By act of Congress of—	
June 3, 1896	$5,000.00
June 4, 1897	350,000.00
July 19, 1897	50,000.00
July 1, 1898	450,000.00
March 3, 1899	400,000.00
March 3, 1901	200,000.00
June 28, 1902	400,000.00
March 3, 1903	400,000.00
April 28, 1904	55,000.00
March 3, 1905 (river and harbor act)	30,000.00
March 3, 1905 (sundry civil act)	40,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

By act of Congress of—Continued.	
March 2, 1907	$75,000.00
March 3, 1909 (allotted Mar. 24, 1909, from emergency appropriations)	20,000.00
Total	2,475,000.00
June 29, 1907, proceeds sale of government property	8.90
June 27, 1910, proceeds sale of government property	2.00
Total	2,475,010.90
June 30, 1910, unexpended balance carried to Improving harbor at Fernandina, Fla., to be reallotted, this work having been consolidated with Fernandina Harbor by river and harbor act of June 25, 1910	6,987.19
Total	2,468,023.71
Grand total	3,400,523.71

COMMERCE.

Value of exports and imports:	
Coastwise, foreign and local	$11,065,000.00
Lumber and timber shipments:	
Foreign, 13,609,000 feet, valued at	267,291.00
Coastwise, 90,422,000 feet, valued at	2,712,000.00
Total	2,979,291.00

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Fernandina, Fla., 1909.

	Arrived.			Cleared.		
	Number.	Tonnage.	Crew.	Number.	Tonnage.	Crew.
Coastwise	54	115,926	1,441	5	11,644	160
Foreign ports:						
American vessels	4	2,670	70	1	735	8
Foreign vessels	32	48,591	678	81	154,874	1,986
Total	90	167,187	2,189	87	167,253	2,154

CONTRACT IN FORCE.

Name and address of contractor: Roderick G. Ross, Jacksonville, Fla.
Character and amount of work: Repairs to jetties, 8,298.6 tons stone.
Rate (in place): $2.74 per ton.
Date of approval: November 24, 1909.
Work begun: November 30, 1909.
Expires: May 28, 1910.
Completed: January 22, 1910.

APPENDIX P.

IMPROVEMENT OF RIVERS AND HARBORS IN THE JACKSONVILLE, FLORIDA, DISTRICT.

REPORT OF CAPT. GEO. R. SPALDING, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. St. Johns River, Florida.
2. St. Johns River, Florida, opposite the city of Jacksonville.
3. St. Johns River at Orange Mills flats, Florida.
4. St. Johns River, Florida, Palatka to Lake Harney.
5. Oklawaha River, Florida.
6. Indian River, Florida.
7. Biscayne Bay, Florida.
8. Harbor at Key West, Florida, and entrance thereto.
9. Kissimmee River, Florida.
10. Orange River, Charlotte Harbor, and Caloosahatchee River, Florida.
11. Sarasota Bay, Florida.
12. Manatee River, Florida.
13. Tampa Bay, Florida.
14. Hillsboro Bay, Florida.
15. Hillsboro River, Florida.
16. Clearwater Harbor and Boca Ceiga Bay, Florida.
17. Crystal River, Florida.
18. Anclote River, Florida.
19. Suwanee River, Florida.
20. Withlacoochee River, Florida.
21. Removing the water hyacinth from Florida waters.

United States Engineer Office,
Jacksonville, Fla., July 20, 1910.

Sir: I have to submit herewith annual report upon river and harbor works in this district for the fiscal year ended June 30, 1910.

Very respectfully,

Geo. R. Spalding,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

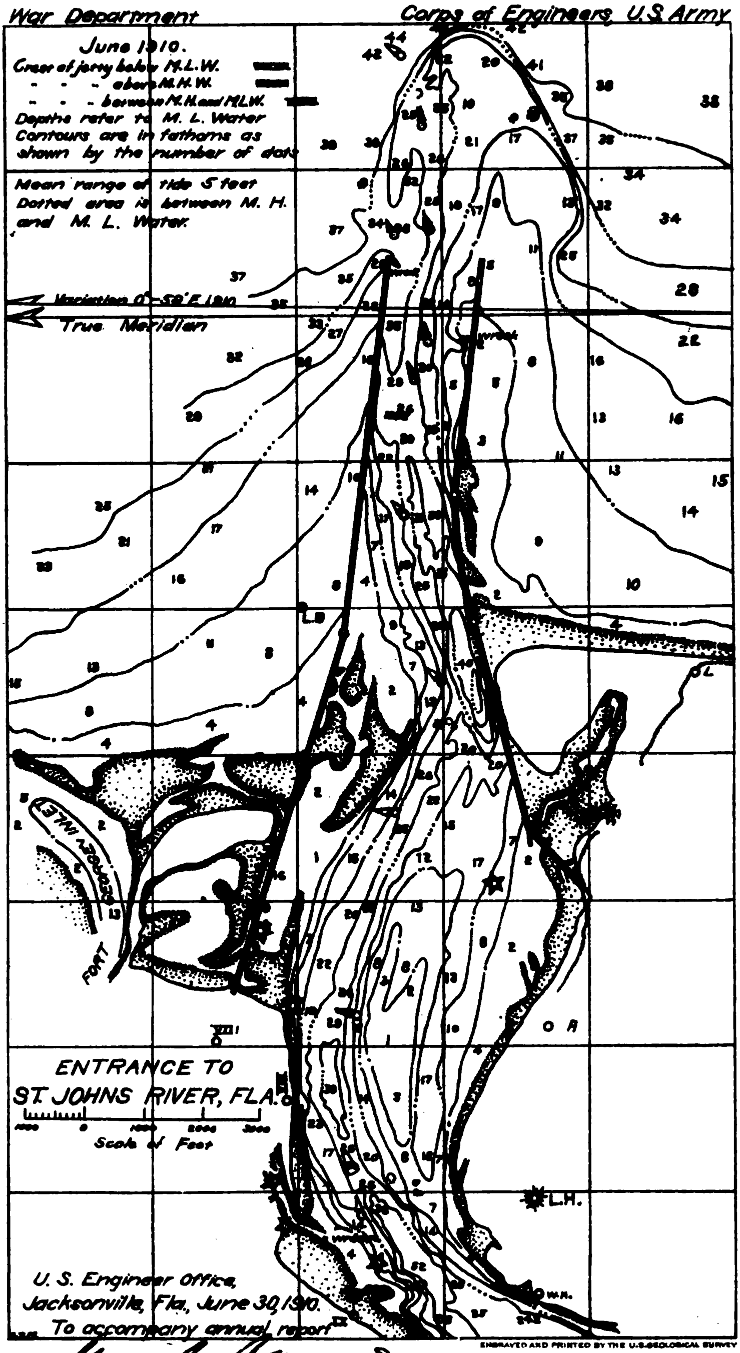
P 1.

IMPROVEMENT OF ST. JOHNS RIVER, FLORIDA.

Work under the contract with the Blackstaff Engineering Company, of Philadelphia, Pa., for placing stone on the jetties at the entrance at the price of $2.24 per ton, entered into June 24, 1909, and approved by the Chief of Engineers July 8, 1909, began October 18, 1909, and continued at irregular intervals during the fiscal year. Under this contract 11,484.2 tons of stone were placed on the jetties. Under date of May 4, 1910, a supplemental contract was entered into with this firm for furnishing about 4,000 tons of stone in smaller pieces than the original contract provided for at the price of $2.14 per ton; 719.4 tons of this stone had been placed at the end of the fiscal year. To advance the work an open-market purchase of 4,695.23 tons of stone was made from R. G. Ross in January and February, 1910, at the price of $2.55 per ton; 14,785.3 tons of the stone furnished was placed on the north jetty and 2,113.5 tons on the south jetty. As a result the outer portion of the north jetty, for a distance of about 1,200 feet, has been built up to a height of from 10 to 12 feet above mean low water and several low places have been raised in the middle portion of the south jetty. At the agreed prices this work cost $39,236.97, of which sum $1,455.52 has been recovered from the Blackstaff Engineering Company under the terms of their contract.

Work under the contract with Roderick G. Ross for dredging and for hire of dredging plant began August 18, 1909. The plant was hired from August 18 to December 20, 1909, and from May 25, 1910, to the end of the fiscal year. Work under contract per cubic yard was in progress from December 28, 1909, to May 25, 1910. The prices paid were 14 cents per cubic yard for dredging at Mile Point and in section C of White Shells shoal, and 40 cents per cubic yard for dredging in section A of White Shells shoal. Dredging between the depths of 25 and 27 feet at mean low water was paid for at one-half the above prices. The price for the hire of dredging plant was $415 per day of twenty-four hours. Under contract for dredging 286,903 cubic yards of material was removed from Mile Point shoal, of which amount 85,008 cubic yards was dredged between the depths of 25 and 27 feet; 30,408.1 cubic yards from section A of White Shells shoal, of which amount 15,492.7 cubic yards was dredged between the depths of 25 and 27 feet, and 105,811 cubic yards from section C of White Shells shoal, of which amount 45,391 cubic yards was dredged between the depths of 25 and 27 feet. At the prices given, this work cost $54,916.72, or a mean of 12.98 cents per cubic yard. With the plant hired under this contract 80,600 cubic yards of material was removed from Sherman Point cut, 48,844 cubic yards from Mayport cut, 11,156 cubic yards from Pilot Town cut, and 17,355 cubic yards from section D of White Shells shoal. Much of this material was compact oyster shell. The sum of $38,014 was paid the contractor for hire of the plant for this work. The cost therefore was 24.07 cents per cubic yard. Under an allotment of $16,000, made from the emergency river and harbor act of March 3, 1909, for the restoration of channel depths from Browns Creek to Brunswick Island this hired plant removed 109,706 cubic yards from Browns Creek cut and 4,160 cubic yards from Clapboard Creek cut during June, 1910. The cost of the hired plant during this period was $9,980.75, or 8.77 cents per cubic yard. This work was still in progress at the end of the fiscal year.

Some obstructive shoals having been disclosed at Trout Creek shoal, work at this place with a clamshell dredging plant, leased from P. Sanford Ross (Incorporated) for $200 per day, began September 8, and continued until November 6, 1909. During this period 7,858 cubic yards of material, mostly rock with some clay and sand, was removed. The amount paid for the use of the plant was $9,750, making the cost $1.24 per cubic yard.


War Department
Corps of Engineers, U.S. Army
June 1910.
Crest of jetty below M.L.W.
" " " above M.H.W.
" " " between M.H. and M.L.W.
Depths refer to M. L. Water
Contours are in fathoms as shown by the number of dots
Mean range of tide 5 feet
Dotted area is between M. H. and M. L. Water.
Variation 0° 58' E 1910
True Meridian
wreck
L.B.
OL
FORT GEORGE INLET
FORT
ENTRANCE TO
ST. JOHNS RIVER, FLA.
1000 0 1000 2000 3000
Scale of Feet
O R
L.H.
W.H.
U. S. Engineer Office,
Jacksonville, Fla., June 30, 1910.
To accompany annual report
ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

Captain, Corps of Engineers, U.S. Army

To stop erosion of the shore line and the consequent deterioration of the channel, a revetment was constructed at New Berlin and the old revetment at St. Johns Bluff was repaired. This work was done under contract with Roderick G. Ross, dated October 27, 1909. Work began November 18, 1909, and was completed January 21, 1910; 4,788 square yards of fascine mattress at 80 cents per square yard and 3,981.05 cubic yards of stone at $3 per cubic yard were used in this work. At the prices stated the cost was $15,773.55.

For the protection of Mile Point Cut, where considerable work of maintenance has been required, the construction of Mile Point training wall was begun December 2, 1909. This work was done partly with a clamshell dredging plant, leased from P. Sanford Ross (Incorporated) at $160 per day, partly by contract with Roderick G. Ross and partly by open-market purchase. The dredging plant worked on Trout Creek shoal from December 2, 1909, to March 7, 1910, and from May 26 to May 31, 1910. Sixteen thousand two hundred and ninety-eight cubic yards of material, mostly rock, was removed during these periods and deposited on Mile Point training wall. The sum of $15,642.50 was paid for the hire of the dredging plant, making the cost 96 cents per cubic yard. This hired dredging plant also worked on shoal places in front of the city of Jacksonville from May 10 to May 25, and from June 1 to June 4, 1910, removing 3,215 cubic yards of material, mostly rock, which was likewise deposited on Mile Point training wall. The cost of the hired plant for this work was $6,267.50, or $1.95 per cubic yard. By open-market purchase and by contract with Roderick G. Ross, dated February 1, 1910, 13,889 square yards of fascine mattress at 70 cents per square yard, 1,212 square yards of fascine mattress at 80 cents per square yard, 19,911 cubic yards of oyster shell at 80 cents per cubic yard, and 6,620.2 cubic yards of stone at $3 per cubic yard were placed in Mile Point training wall between January 4 and April 18, 1910, in addition to the dredged material before mentioned. As a result the training wall was built from the shore near Sherman Point, a distance of 8,300 feet, or to a point 10,000 feet up stream from Sherman Point with a fascine-mattress foundation ballasted with 1 foot of stone; 2,600 feet of this, measured from the shore end, has been practically completed to mean low water, and 1,000 feet more has been built up an average of 5 feet above the original bottom. The expenditure on the training wall, before stated, aggregates $68,391.40.

The U. S. dredge *Key West* worked on this improvement from December 29, 1909, to March 12, 1910, and from April 10 to May 17, 1910. During this time the dredge removed 77,373 cubic yards from Wards Bank and Jetty shoals, 40,677 cubic yards from Fulton, Clapboard Creek, and Browns Creek shoals, and 15,425 cubic yards from section C of White Shells shoal. The cost of this work was $11,619.39, or 8.7 cents per cubic yard.

A small scale map of the entrance to the river from a survey made in June, 1910, is submitted herewith. This map indicates that the stable conditions in the channel location, previously noted, still continue to obtain. It is of special interest to note that the outer slope of the bar has not advanced seaward during the year. The channel depths show an improvement over those of last year. A considerable volume of sand continues to come in over the north jetty. This appears to be carried to the outer bar, from where it is swept by wave action and finds lodgment along the south side of the south jetty, where a considerable accumulation is noted.

As a result of the work in the river above the entrance, channel depths have been restored at Sherman Point, Mayport, Pilot Town, Mile Point, White Shells, and Browns Creek shoals. The restoration of channel depths at Clapboard Creek shoal is nearly completed, and that at Fulton shoal is about to be undertaken. The channel at Browns Creek and Clapboard Creek and the lower end of Mile Point shoal is only 150 feet wide to the full depth of 24 feet and over. Shoaling has been noted at St. Charles Creek shoal. Elsewhere the channel has required no work of maintenance. The available channel depth is at present limited by St. Charles Creek shoal to 23 feet at mean low water.

As a result of all the work which has been done the 24-foot project may be said to be entirely completed. In the last annual report an estimate amounting to $342,000 was made for expenditure during the fiscal year ending June 30, 1911, toward the completion and maintenance of the 24-foot project, of which amount $67,000 was required for rock excavation at Trout Creek and White Shells, $85,000 for dredging and bank protection, and $200,000 for restoration of the jetties to a height which would prevent the entrance of sand.

In preference to appropriating any sum toward the completion and maintenance of this old project, Congress, by the act of June 25, 1910, adopted the project for 30 feet from Jacksonville to the ocean and appropriated $300,000 to begin the work outlined in House Document No. 611, Sixty-first Congress, second session, the total estimated cost of which is $2,852,000. This new project carries with it the rock removal at Trout Creek and White Shells and the bank protection and dredging estimated as necessary to be done during the year for the maintenance of the 24-foot project, but does not carry with it the $200,000 estimated as being necessary for restoring the jetties. While there is perhaps no immediate danger that the jetties will cease to be efficient if this work of maintenance is not done upon them, it is believed that in the long run a saving will be made if the work is done soon.

For continuation of the work on the new project the sum of $844,950 can be advantageously expended during the next fiscal year. Of this amount $75,000 will be required for the operation of government plant in widening and deepening the channel between Mayport and the ocean; $150,000 will be required in deepening to 30 feet for one-half the projected width of channel from Dames Point to White Shells; $302,000 will be required to secure 30 feet for one-half channel width through the rock shoals at Trout Creek; and the remaining $317,950 will be required to complete the bank protection and training-wall work contemplated. The expenditure of this sum, together with the work which it is proposed to do with funds in hand will give satisfactory conditions along the most troublesome portions of the channel, and it is confidently expected will secure a channel of not less than 26 feet from the deep-water terminals to the sea, thus giving at least partial relief to commerce before the entire projected depth is obtained.

The dredges *St. Johns* and *Jacksonville* remained in the New Orleans and Wilmington (N. C.) districts, respectively, during the year. For rent of the *Jacksonville* $6,036.02 was received, and $13,715 was received for rent of the *St. Johns.*

For further information, see Current Summary, page 407.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $844,950

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Under the original project appropriations were made for the work, as shown by House Document No. 421, Fifty-seventh Congress, second session, amounting to $1,417,000.

Under the existing project of improvement appropriations have been made:

June 3, 1896	$200,000.00
March 3, 1899	200,000.00
June 13, 1902	350,000.00
March 3, 1903	350,000.00
April 28, 1904	395,000.00
March 3, 1905 (sundry civil act)	205,000.00
March 3, 1905	100,000.00
June 6, 1900 (allotment of Dec. 20, 1901, from emergency appropriation)	10,000.00
June 30, 1906 (sundry civil act)	309,750.00
March 2, 1907	100,000.00
June 13, 1902 } March 3, 1905 } allotment of January 3, 1907, from emergency appropriation	12,339.02
Receipts from various sources prior to June 30, 1909	3,041.23
Receipts from sales	12.97
March 3, 1905 (allotments of Aug. 21, 1908, $4,000, and Oct. 15, 1908, $6,000)	10,000.00
March 2, 1907 (allotment of Nov. 26, 1907, from emergency appropriation)	10,000.00
March 3, 1909	300,000.00
March 3, 1909 (allotment of May 7, 1910, from emergency appropriation)	16,000.00
Rent of U. S. dredges *St. Johns* and *Jacksonville*	19,751.02
June 25, 1910	300,000.00
Total	2,890,894.24

CONTRACTS IN FORCE.

Contractor: Blackstaff Engineering Company.
Amount and character of material: About 45,000 tons of rock on the jetties.
Price per unit: $2.24.
Date of approval: July 8, 1909.
Date of beginning work: October 12, 1909.
Date of expiration: October 12, 1910.
Supplemental:
Amount and character of material: About 4,000 tons small stone on jetties.
Price per unit: $2.14.
Date of approval: May 17, 1910.

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[a] Exclusive of the balance unexpended July 1, 1910.

Contractor: Roderick G. Ross (dredging).

Amount and character of material and price per unit: Dredging 278,000 cubic yards of sand and mud at Mile Point at 14 cents; 25,000 cubic yards coquina at section A, White Shells, at 40 cents; dredging 91,600 cubic yards of sand and mud at section C, White Shells, at 14 cents.

Date of approval: July 15, 1909.

Date of beginning work: August 20, 1909.

Date of expiration: October 20, 1910.

Contractor: Roderick G. Ross (hire of dredging plant).

Period: About 200 days.

Price per day: $415.

Date of approval: July 15, 1909.

Date of beginning work: August 20, 1909.

Date of expiration: October 20, 1910.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	2,097	150	2,247	2,003,197	103,962
Sailing	1,837	234	2,071	1,215,500	....
Yachts	501	....	....	....	....

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
Cement	73,225 barrels	14,645	$146,450
Coal	185,722 tons	185,722	928,610
Fertilizer	486,180 sacks	48,618	1,944,720
Gasolene and oil	552,085 barrels	110,417	386,595
Lumber and cross ties	316,530,000 feet	791,326	2,769,641
Merchandise, including cotton	699,736 tons	699,736	69,973,600
Phosphate	156,786 tons	156,786	783,930
Salt	50,800 sacks	2,540	27,940
Steel rails	6,030 tons	6,030	361,800
Total	....	2,015,820	77,323,286

Number of regular steamers in trade, 27.

Estimated percentage of total trade carried by water, 60 per cent.

Probable increase of trade were the improvement completed, 75 per cent.

Effect of improvement on freight rates—has kept them down.

Probable effect of further improvement—will continue to cause a low and steady rate.

Transportation business established during 1909, one, the Cook Line to Miami.

Transportation business abandoned during 1909, none.

Custom receipts, $32,918.72.

Internal-revenue receipts, $1,230,629.81.

Number of wholesale houses, 55; annual business, $25,000,000.

Number of factories, all kinds 600; annual business, $15,000,000.

P 2.

IMPROVING ST. JOHNS RIVER, FLORIDA, OPPOSITE THE CITY OF JACKSONVILLE.

Dredging under the contract with P. Sanford Ross (Incorporated) continued until September 4, 1909, when the contract was completed—43,096.66 cubic yards of material, mostly rock, was removed. At the contract price, $3.03 per cubic yard, this work cost $129,289.98. A clear depth of not less than 24 feet at mean low water has been secured from the Florida East Coast Railway bridge to the west side of Catherine street, between the pierhead line and the deep water of the channel.

Urgent need for the removal of a rock shoal in the unfinished portion of the work having arisen, an emergency contract was entered into with P. Sanford Ross (Incorporated) to break the rock and dredge to a depth of 21 feet over the shoal area; 3,076.8 cubic yards of material, mostly rock, was removed at a cost of $10,853.80, or $3.53 per cubic yard.

Three thousand two hundred and fifteen cubic yards of rock from another shoal area in the unfinished portion of this work was broken up and dredged and deposited on Mile Point training wall, at a cost of $6.267.50, or $1.95 per cubic yard. This work was not at the expense of this improvement, the rock being quarried for use on another improvement and the resulting increase of depth of water being merely incidental.

The river and harbor act of June 25, 1910, appropriated $115,000 for continuing this improvement.

For further information, see Current Summary, page 411.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

March 2, 1907	$371,500
June 25, 1910	115,000
	486,500

CONTRACTS IN FORCE.

Contractor: P. Sanford Ross (Incorporated).

Amount and character of material: About 99,000 cubic yards of rock, sand, and clay.

Price per unit: $3.03 per cubic yard.

Date of approval: September 23, 1907.

Date of beginning work: October 1, 1907.

Date of expiration: May 8, 1909 (extended for a reasonable period; completed September 4, 1909).

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

See report for improving St. Johns River, Florida, general improvement.

P 3.

IMPROVING ST. JOHNS RIVER, FLORIDA, AT ORANGE MILLS FLATS.

Work under the allotment of $3,000, made June 10, 1909, began with a dredging plant hired from P. Sanford Ross (Incorporated) at $160 per day on March 8, and continued until March 24, 1910. Further shoaling having occurred an additional allotment of $8,640 was made on March 18, 1910, from the emergency river and harbor appropriation of March 3, 1909. Proposals were solicited for doing the work by contract. The contract was awarded to P. Sanford Ross (Incorporated) on April 5, 1910, at the price of 12 cents per cubic yard. In the meanwhile the work had been continued by P. Sanford Ross (Incorporated) at an agreed price of 12 cents per cubic yard. The contract was completed May 7, 1910. With the hired plant 24,700 cubic yards were removed and with the plant working by the cubic yard and under contract 67,370.9 cubic yards were removed, making a total of 92,070.9 cubic yards. The channel depth of between 13 and 14 feet at mean low water was restored for a width of 80 feet through the shoal at Orange Mills flats in the vicinity of Federal Point. The cost of the work at the agreed price and contract prices was $10,484.51, or 11.4 cents per cubic yard.

The river and harbor act of June 25, 1910, appropriated $32,400 for continuing improvement, Jacksonville to Palatka.

For further information see current summary, page 412.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $32,600
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

March 3, 1899	$40,000
June 13, 1902	30,000
March 3, 1905	25,000
March 3, 1905 (allotment of July 3, 1909, from emergency appropriation)	3,000
March 2, 1907	25,000
March 3, 1909 (allotment of Mar. 18, 1910, from emergency appropriation)	8,640
June 25, 1910 (Jacksonville to Palatka)	32,400
Total	164,040

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	2,334	696,144	40,000
Sailing	98	18,100	

Note.—The above includes arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Building material	19,000 cases	1,000	$180,000	60	5.0
Coal	2,000 tons	2,000	10,000	60	
Cross-ties	53,600	8,933	44,665	60	
Fertilizer	27,500 sacks	2,750	110,000	60	
Fish	4,800 barrels	960	6,720	60	4.0
Grain	514,000 sacks	25,700	1,156,500	60	2.0
Hay	704,000 bales	35,200	633,600	60	3.3
Lumber	55,137,000 feet	110,274	1,546,280	60	1.7
Machinery	3,700 tons	3,700	3,700,000	60	
Merchandise and groceries	3,413,200 cases	167,935	6,717,400	60	5.0
Naval stores	50,866 barrels	1,272	66,040	60	
Oranges	265,000 boxes[a]	11,160	446,400	60	
Fruits	18,750 boxes	750	22,500	60	
Peat	3,600 tons	3,600	10,800	60	5.0
Shingles	14,446	3,130	71,990	60	1.7
Vegetables	50,000 crates	1,500	185,000	60	
Total		379,864	14,907,895		

[a] Estimated.

Number of regular steamers in trade, 4.

Estimated percentage of total trade carried by water, 65 per cent.

Probable increase of trade were the improvement completed: A 16-foot channel would increase the trade 200 per cent.

Effect of improvement on freight rates: Rates have been held down to 50 per cent of the rates charged for corresponding distance where there is no water competition.

Probable effect of further improvement: Will reduce rates 25 per cent.

Transportation business established during 1909: One; Consolidated Naval Stores Company Line, Jacksonville to Crescent Lake and Salt Springs.

Transportation business abandoned during 1909, none.

P 4.

IMPROVING ST. JOHNS RIVER, FLORIDA (PALATKA TO LAKE HARNEY).

The river and harbor act of June 25, 1910, appropriated $32,400 for the improvement of St. Johns River, Florida, from Palatka to Lake Harney, in accordance with the report submitted in House Document No. 1111, Sixtieth Congress, second session, which contemplates securing a channel 8 feet deep and 100 feet wide between

Palatka and Sanford and 5 feet deep and 100 feet wide between Sanford and Lake Harney, at an estimated cost of $129,600, with $6,000 annually for maintenance. At the close of the fiscal year no work has been done under this project.

VOLUSIA BAR.

Work in the section of the river above Palatka having been largely confined to the vicinity of Volusia bar has been appropriated for under that heading. Under date of March 17, 1909, an allotment of $5,000 for the maintenance of this improvement was made from the emergency river and harbor act of March 3, 1909. Work was begun under this allotment on January 12, 1910, with a small clamshell dredge hired from Merrill-Stevens Company, of Jacksonville, at $60 per day. With this dredge 9,710 cubic yards of material were removed from the shoals at Volusia bar, Revolving Bend, Florida Bend, Coxetters Bend, and Dutchman's Bend, at a cost of $3,994.68, including superintendence and inspection, or $0.4114 per cubic yard. This work was completed March 18, 1910.

Under contract with Wm. M. Boyd, of Palatka, Fla., for renewing guide piling at Volusia bar, 143 piles were driven in clusters of three, bolted together, and 123 old piles were cut off. This work began February 28 and was completed March 26, 1910, at a cost of $1,005.32, including superintendence and inspection. The result of the work under the above allotment has been the restoration to good condition of the projected channel and the pile-guiding dikes.

In my opinion the locality under improvement is worthy of further improvement along the lines of the project of June 25, 1910, and the entire estimated amount for the completion of project, $97,200, can be advantageously expended during the fiscal year ending June 30, 1912, together with an additional amount of $3,000 for maintenance at Volusia bar during improvement.

For further information see current summary, page 413.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS (VOLUSIA BAR).

June 14, 1880	$5,000	April 28, 1904	$2,000
March 3, 1881	5,500	March 3, 1905	2,000
August 2, 1882	5,000	March 2, 1907	2,000
July 5, 1884	2,000	March 3, 1905 (allotment June 3, 1907, from emergency appropriation)	5,000
August 5, 1886	7,500		
August 11, 1888	500		
September 19, 1890	500	March 2, 1907 (allotment Sept. 30, 1908, from emergency appropriation)	1,840
July 13, 1892	1,000		
August 18, 1894	1,000		
June 3, 1896	1,000	March 3, 1909	5,000
March 3, 1899	2,000		
June 13, 1902	2,000	Total	50,840

APPROPRIATION (PALATKA TO LAKE HARNEY).

June 25, 1910	$32,400

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered: Steamers	558	178,578	36,000

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Building material	800 cases	40	$7,200	202	....
Cattle	1,280 head	320	19,200	202	1.0
Cement	300 barrels	60	600	202	.7
Coal	30 tons	30	150	202	.7
Cross-ties	55,000	5,500	27,500	202	.6
Fertilizer	26,000 sacks	2,600	104,000	202	.7
Fish, etc	2,000,000 pounds	1,000	60,000	202	....
Flour	10,250 barrels	1,025	56,375	202	1.5
Gasoline, etc	350 barrels	70	2,450	202	....
Grain	58,000 sacks	2,900	116,000	202	1.7
Hay	46,000 bales	2,300	41,400	202	....
Hides, etc	2,100 packages	30	1,950	202	....
Lumber, cedar	8,400,000 feet	21,000	168,000	202	.6
Lumber, cypress	3,875,000 feet	11,600	232,000	202	.6
Merchandise	2,247,420 cases	23,580	2,280,000	202	3.1
Naval stores	15,200 barrels	3,800	247,000	202	....
Oranges	175,000 boxes	7,000	280,000	202	1.2
Other fruits	840 tons	840	25,200	202	....
Railroad supplies	100 tons	100	10,000	202	....
Shingles	100,000	25	575	202	....
Vegetables	74,000 crates	1,850	231,250	202	1.9
Total	....	85,670	3,910,850	....	....

Number of regular steamers in trade, 1; 2 in busy season.

Estimated percentage of total trade carried by water, 60 per cent.

Probable increase of trade were the improvement completed, 30 per cent.

Effect of the improvement on the freight rates has held rates down 50 per cent.

Probable effect of further improvement on freight rates will hold rates down 50 per cent.

Transportation lines established during 1909, none.

Transportation lines abandoned during 1909, none.

P 5.

IMPROVEMENT OF OKLAWAHA RIVER, FLORIDA.

Under the allotment of $4,000, made March 17, 1909, from the appropriation made in river and harbor act of March 3, 1909, work began with a clamshell dredge hired from Merrill-Stevens Company, at $60 per day, on April 18, and was completed June 8, 1910. A cut-off just above Grahamville was completed, 40 feet wide and 6 feet deep, and several points and shoals and snags and overhanging trees were removed between Grahamville and Osceolas Old Field, a point 5 miles below Grahamville and 46 miles above the mouth of the river.

In this work 11,795 cubic yards of sand and mud, 771 snags and logs, and 758 overhanging trees were removed. The result of this work is the improvement of perhaps the worst section of the river between Silver Springs and the mouth.

The river and harbor act of June 25, 1910, appropriated $20,710 for continuing this improvement and for maintenance, providing that so much of this sum as may be necessary for that purpose may be used for the maintenance of levels in the lakes at the head of said stream.

For further information see current summary, page 414.

APPROPRIATIONS.

September 19, 1890	$10,000	March 3, 1905	$2,000
July 13, 1892	1,000	March 2, 1907	15,000
August 18, 1894	3,000	March 3, 1909	4,000
June 3, 1896	3,000	June 25, 1910	20,710
March 3, 1899	3,000		
June 13, 1902	2,000	Total	63,710

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered: Steamers	878	27,176	12,300
Unregistered: Rafts	[a] 750		

[a] Estimated. About 400 power boats on upper lakes.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Logs, pine	20,000,000 feet b. m.	[a] 60,000	$210,000	60	
Logs, cypress	690,000 feet b. m.	[a] 26,000	120,000	60	
Merchandise and groceries	10,000 tons	[b] 10,000	2,000,000	140	3.6-8.8
Naval stores	32,000 barrels	[b] 8,000	512,000	140	2.8
Oranges and vegetables	162,500 crates	[b] 5,000	412,000	140	3.5-4.3
Total		109,000	3,254,000		

[a] Estimated.

[b] Round numbers.

Number of regular steamers in trade, 1; 2 during tourist season.

Estimated percentage of total trade carried by water, 20 per cent.

Probable increase of trade were the improvement completed, 200 per cent.

Effect of improvement on freight rates: Has given a low freight rate to Ocala, and the water commerce has decreased on certain articles.

Probable effect of further improvement, lower rates.

Transportation business established during 1909, none.

Transportation business abandoned during 1909, none.

P 6.

IMPROVING INDIAN RIVER, FLORIDA.

Between Goat Creek and Jupiter Inlet.—No work was done on this portion of the river during the year. It is proposed to undertake the work with the balance of the allotment made March 17, 1909, from the appropriation made in the river and harbor act of March 3, 1909, with the United States dredge *Florida*, during the next month.

The river and harbor act of June 25, 1910, appropriated $13,000 for continuing this improvement and for maintenance.

Jupiter Inlet.—This inlet closed again in May, 1909, after having been opened a few months previous by the citizens of the vicinity. With the allotment of $2,000 made June 8, 1909, from the emergency river and harbor act of March 3, 1905, the work of excavating a trench for the purpose of opening the inlet began July 7, 1909, and ceased on August 16, 1909, to await a favorable opportunity to make the final opening. The trench was 425 feet long, 22 feet wide on the bottom, with side slopes of 1 to 3½, and required the removal of 5,050 cubic yards of sand. A semicircular embankment, consisting of 300 sand bags in double row, four tiers high, was built about 10 feet back of the extreme high-water line, to protect the trench from storm waves. Four unsuccessful attempts were made during September, 1909, to open the inlet. At one time an opening 20 feet wide and 2 feet deep was made during the ebb tide, but an increasing ground swell on the returning flood checked the outflow, undermined the high banks, and caused them to fall into the trench. A dam was built across the entrance and further work, excepting maintenance, was abandoned until the sea moderated. Frequent repairs were made to the dam up to the end of November. During the night of December 1 the sea became very rough, although the wind was moderate. The waves swept completely over the sand ridge between the ocean and the river. The ridge is 9 feet high and 400 feet wide. The cut was entirely filled with sand and the trench which had been made was entirely obliterated. The funds remaining are inadequate to accomplish the work under present conditions. In case an unusually high stage of water occurs inside when the sea is smooth a temporary opening may be secured, as was done in 1908. Without protecting works, which can only be built at considerable expense, it is impracticable to maintain a permanent opening at this place.

This locality is not considered worthy of further improvement, as the commercial interests involved are not of sufficient magnitude to warrant the expenditure necessary to make the undertaking permanently successful.

The community is well served by the Florida Coast Line and the Florida East Coast Railway. Local fishing interests, no doubt, and the health of the community are probably injuriously affected by reason of the inlet being closed.

For further information see current summary, page 415.

APPROPRIATIONS.

Appropriations have been made for improving Negro Cut, as shown by House Document No. 421, Fifty-seventh Congress, second session, amounting to $32,500.

Under present project:

July 13, 1892 (between Goat Creek and Jupiter Inlet)	$15,000.00
February 26, 1896 (Jupiter Inlet)	500.00
June 13, 1902 (between Goat Creek and Jupiter Inlet)	2,000.00
March 3, 1905 (between Goat Creek and Jupiter Inlet)	20,000.00
Allotment from emergency river and harbor appropriation of June 6, 1900 (for opening Jupiter Inlet, Feb. 2, 1901, $800; Feb. 28, 1901, $200)	1,000.00
For rent of dredge	14.62
March 2, 1907 (between Goat Creek and Jupiter Inlet)	9,000.00
Allotments from emergency river and harbor appropriation of March 2, 1907 (between Goat Creek and Jupiter Inlet, Apr. 3, 1908, $5,000; May 26, 1908, $5,000)	10,000.00
March 3, 1909	4,000.00
March 3, 1905 (allotment of June 8, 1909, from emergency appropriation)	2,000.00
June 25, 1910	13,000.00
Total	76,514.62

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers[a]	924	13,200	11,000
Sailing	18	920	....

[a] In addition there are 1,005 motor boats on the river.

NOTE.—The above includes arrivals and departures.

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.
				Miles.
Beans	53,000 crates	1,325	$159,000	5-10
Cement	20 barrels	4	40	5-10
Fertilizer	3,400 sacks	340	13,600	5-10
Fish	358,000 barrels	179	12,512	5-10
Gasoline, etc	2,300 barrels	460	16,100	5-10
Hay	1,000 bales	50	900	5-10
Lumber, pine	185,000 feet b. m.	462	1,617	5-10
Merchandise	790 tons	790	43,300	5-10
Oranges	32 700 boxes	1,320	52,800	5-10
Palmetto branches	50 tons	50	4,000	5-10
Shingles	118,000	30	690	5-10
Vegetables	25,000 crates	625	78,125	5-10
Total		5,635	382.684	

Tonnage carried by railroad, 544,000 tons.

Number of regular steamers in trade, 3.

Estimated percentage of total trade carried by water, 100 per cent of island trade; none of mainland trade.

Probable increase of trade, were the improvement completed, would be several hundred per cent.

Effect of improvement on freight rates, none.

Probable effect of further improvement on freight rates, would reduce rates 50 per cent.

Transportation business established during 1909, none.

Transportation business abandoned during 1909, none.

P 7.

IMPROVEMENT OF BISCAYNE BAY, FLORIDA.

Work continued under the contract with P. Sanford Ross (Incorporated) during the year—42,170.74 cubic yards of rock and 9,870.39 cubic yards of soft material were removed, completing the channel 85 feet wide from shoreward to within a distance of about 700 feet of the 20-foot contour at sea. The depth attained varied from 18 feet at mean low water at the inner end to 19 feet at the outer end. The contract prices were $1.78 per cubic yard for rock and 24 cents per cubic yard for soft material. At these prices this work cost $77,432.81. Drilling and blasting ahead of the dredging work had been nearly completed at the end of the year.

Under an emergency contract with R. G. Ross, dated May 14, 1910, 372.13 cubic yards of local limestone was placed on the north jetty near the shore to prevent sand movement across the work, and 129.59 cubic yards was placed in a pile near at hand to be used in a like emergency in the future. This work began May 25 and was completed June 6, 1910. The contract price was $3.40 per cubic yard. At this price the work cost $1,705.85.

On June 4, 1910, the attention of the Florida East Coast Railway Company was invited to the fact that the work to be done by the United States under its agreement with that company was nearing completion and that it would then be incumbent upon the railroad company to complete its portion. The president of the company informed the district officer under date of June 7, 1910, that as soon as their dredging plant could be reorganized the work would be done.

Attention is invited to the fact that the plan proposed by the Board of Engineers, approved in accordance with the river and harbor act of 1899, contemplated a channel between the jetties having a width of 300 feet. The width of 100 feet, for which expenditures have so far been authorized, will not permit the channel to be navigated safely by anything but very light-draft craft. Indeed it is believed that it will be little, if any, better than the present existing channel around Cape Florida. To complete the channel to a proper width, which in my opinion should not be less than 300 feet, through a rock cut will require an appropriation of $258,000.

The river and harbor act of June 25, 1910, appropriated $5,000 for the maintenance of the present completed work and also provided for a survey with a view to securing a channel 20 feet deep and 300 feet wide through the entrance and of the same depth and 150 feet wide thence to the mouth of the Miami River.

It is proposed to expend the available balance in prosecuting the improvement by rock excavation, in maintenance of jetties, and dredging the channel.

For further information see current summary, page 416.

APPROPRIATIONS.

Act of June 13, 1902	$50,000.00
Act of March 3, 1903	250,000.00
Overpayment prior to July 1, 1905	.48
March 3, 1905 (allotment from emergency appropriation on November 27, 1905)	[a] 10,000.00
March 2, 1907	100,000.00
May 27, 1908 (sundry civil act)	119,000.00
March 4, 1909 (sundry civil act)	27,000.00
June 25, 1910	5,000.00
Total	561,000.48

CONTRACTS IN FORCE.

Contractor: P. Sanford Ross (Incorporated).

Amount and character of material: Dredging—about 154,000 cubic yards sand; 92,000 cubic yards rock.

Construction of breakwater: About 4,500 tons hard rock; about 17,000 cubic yards coral rock.

Price: Rock removed, $1.78 per cubic yard; sand, 24 cents per cubic yard; hard rock for breakwater, $5.50 per ton; coral rock, $2.50 per cubic yard.

Date of approval: January 9, 1904.

Date of beginning work: March 14, 1904.

Date of expiration: March 14, 1906. (Work suspended by supplemental agreement dated August 24, 1906. Work resumed July 21, 1909.)

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	974	288,592	7,000
Sailing	500	26,000	2,000
Yachts	262	10,480	....
Unregistered: Steamers	[b] 15,000	....	....

[a] Returned to the Treasury, $240.83.

[b] Estimated.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
Bananas	20,000 bunches	250	$30,000
Building material	2,780 cases	139	25,020
Cattle	8,000 head	2,000	120,000
Cement	5,665 barrels	1,133	14,330
Coal	400 tons	400	2,000
Crate material	18,400 packages	92	2,760
Fertilizer	85,130 sacks	8,513	340,520
Fish	15,000,000 pounds	7,500	450,000
Flour	7,870 barrels	787	47,220
Gasoline, etc	4,180 barrels	836	32,500
Grain	108,560 sacks	5,428	244,260
Groceries, etc	206,916 cases	10,154	2,036,625
Hay	140,000 bales	7,000	126,000
Hides and skins	17,500 packages	250	16,250
Lumber, pine	11,700,000 feet b. m	35,125	700,000
Machinery	32 tons	32	5,600
Merchandise	973,035 cases	48,642	4,918,564
Oranges	220,000 boxes	8,800	352,000
Oysters	7,000 barrels	500	4,000
Pineapples	240,000 crates	6,000	400,000
Railroad supplies	60,000 tons	60,000	2,400,000
Tobacco	42,000 bales	2,100	3,780,000
Vegetables	52,800 crates	1,320	165,000
Total		207,001	16,212,649

Number of regular steamers in trade, 1; 2 in winter season.

Estimated percentage of total trade carried by water, 20 per cent.

Probable increase of trade were the improvement completed, 100 per cent.

Effect of the improvement on freight rates: Has reduced rates 50 per cent.

Probable effect of further improvement on freight rates: Will reduce rates still more.

Transportation lines established during 1909, 1—the Cook Steamship Line to Jacksonville.

Transportation lines abandoned during 1909, none.

P 8.

IMPROVEMENT OF HARBOR AT KEY WEST, FLORIDA, INCLUDING ENTRANCE THERETO.

The dredge *Key West* arrived at Key West to work on the channel at the northwest entrance September 30, 1909. Work began October 6 and continued until December 10, 1909. The dredge left Key West for Jacksonville, Fla., for repairs on December 14, 1909. The dredge was retained for work in the St. Johns River and arrived back at Key West May 22, 1910. Dredging was resumed May 25. During the year a total of 159,389 cubic yards of material was removed from the inner shoal at northwest entrance to the harbor, at a cost of $19,229.12, including extensive repairs and other incidentals, or 12.06 cents per cubic yard.

No work was done during the year from the balance remaining of the $5,000 authorized for removing coral heads from the main ship channel. To complete the work three coral heads should be removed. It is purposed to do this work at the earliest possible date.

From its inception, this improvement has not been considered as a local work. The Board of Engineers which recommended the present plan of improvement held the channel to be much more than a northwest entrance to the harbor of Key West, stating that "It is the natural highway of commerce between all our Gulf ports and the Atlantic Ocean, and that if improved sufficiently to make it available at all stages of the tide and in all weathers, an enormous increase in its use would result, as many of the dangers of the worst navigation on our entire seaboard will be avoided by its use." It was the Board's opinion that a tentative project contemplating dredging to secure a channel of 17 feet, protected by the east jetty, should be adopted, and that the results of this work should be awaited before the entire plan proposed was adopted.

It is believed that the feasibilty of securing and maintaining a channel of sufficient depth to take care of practically all of the Gulf-Atlantic trade has been proven by the results so far accomplished, and that the more comprehensive plan could now be safely adopted.

The result of the work which has been done has been the securing of a channel of full projected depth, but of insufficient width and depth to insure its permanency. It is proposed to expend the available balance and the amount recommended as a profitable expenditure during the fiscal year ending June 30, 1912, in securing a channel of sufficient cross section to attract and train the tidal flow with a view to securing a permanent condition.

In my opinion the locality is worthy of further improvement along the lines of the broader plan considered by the Board of Engineers.

For further information see current summary, page 418.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $45,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Under previous project appropriation was made for the work as shown by House Document No. 421, Fifty-seventh Congress, second session, amounting to	$25,000.00
August 5, 1886 (survey)	2,500.00
August 11, 1888	25,000.00
September 19, 1890	40,000.00
July 13, 1892	75,000.00
August 18, 1894	80,000.00
June 3, 1896	80,000.00
March 3, 1899	25,000.00
Allotments (July 2, 1900, $5,000; July 3, 1901, $5,000) from emergency river and harbor act June 6, 1900	10,000.00
June 13, 1902	100,000.00
March 3, 1905	50,000.00
Received from sales	1.50
Received from other sources	51.97
March 2, 1907	200,000.00
Total	712,553.47

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	1,123	20	1,143	2,370,598	27,000
Sailing	3,580		3,580	185,010	
Yachts	134		134	74,920	
Unregistered [a]					

[a] A large number of American steamers and sailing vessels.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Bananas	44,400 bunches	796	$20,800
Brick	50,000,000	125	600
Building material	2,520 cases	126	12,774
Crude petroleum	3,000 barrels	750	8,250
Cattle	5,020 head	753	100,584
Cement	143,625 barrels	21,307	242,550
Cigars	21,000 cases	1,312	5,100,000
Coal	38,713 tons	38,713	175,971
Cross-ties	10,000,000	1,000	4,000
Clams	250 tons	250	15,000
Fertilizer	11,760 sacks	1,176	42,029
Fish	6,720 barrels	672	61,556
Flour	10,513 barrels	1,051	52,565
Gasoline and light oils	6,186 barrels	1,500	41,075
Grain	12,000 sacks	1,135	32,845
Groceries and produce	199,827 cases	5,683	1.239,535
Hay	12,000 bundles	600	12,800
Lumber	2,857,000 feet	7,020	120,300
Merchandise, miscellaneous	740,497 packages	21,153	4,064,212
Oil machine	3,757 barrels	1,032	25,167
Oranges and grape fruit	24,768 boxes	913	38,653
Other fruits	52,300 boxes	2,000	132,794
Salt	400 sacks	20	1,100
Sand, building	6,500 cubic yards	8,125	18,000
Shingles	75,600,000	7,560	4,000
Sponges	240,000 strings	150	275,000
Sugar	5,800 barrels	870	87,000
Tannic woods	450 tons	450	22,500
Tobacco	36,260 bales:	1,813	3.827,795
Turtle and turtle soup	400 tons	400	60,665
Vegetables	27,000 crates	670	38,000
Total		129,125	15,878,120

Number of regular steamers in trade, 9.

Estimated percentage of total trade carried by water, 100 per cent.

Probable increase of trade were the improvement completed: Large increase to both local and passing trade; 567 vessels used the northwest channel during 1909, thereby saving 65 miles on each trip.

Effect of improvement on freight rates: Water rates reduced. There is no railroad connection.

Probable effect of further improvement, further reduction.

Transportation business established during 1909, none.

Transportation business abandoned during 1909, none.

P 9.

IMPROVEMENT OF KISSIMMEE RIVER, FLORIDA.

Under an allotment of $600, made May 21, 1909, from the appropriation for emergencies in river and harbor works, act of March 3, 1905, 2,800 cubic yards of material were removed from various shoal places in the river, principally in the vicinity of Rosalie, Fla., practically restoring channel depths in this portion during ordinary stages.

The field work on the survey of the river directed by the act of March 3, 1909, was completed during the year, and the study of the river is now being made.

It would appear from this study that the principal difficulty on the river occurs at low-water season in the artificial cuts connecting the lakes in which at present the low-water flow is very small.

The river and harbor act of June 25, 1910, appropriated $5,000 for the maintenance of this improvement and it is proposed to expend this sum and the available balance on works of maintenance of present channel depths by confining the low-water flow to the main channel as far as it may be possible. It is believed that no further expenditure beyond the available balance should be expended on the lines of the present project, as very little further good can be accomplished in this manner. The question as to whether the river is worthy of further improvement depends very largely upon the completion of the present studies and the cost of a more comprehensive improvement which will permit a greater low-water flow in the upper reaches of the river. The lower reaches of the river are in good condition for 3-foot navigation except at a very few localities.

For further information, see current summary, page 419.

APPROPRIATIONS.

June 13, 1902	$8,000
March 3, 1905	7,000
March 3, 1905 (allotment May 21, 1909, from emergency appropriation)	600
March 2, 1907	12,221
Receipts from sales	26
June 25, 1910	5,000
Total	32,847

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered: Steamers	116	1,744	320
Unregistered:			
Steamers	700	2,800	
Lighters	120	2,800	
Rafts	600		

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Brick	14,000	35	$700	80	7½
Building material	2,000 cases	100	18,000	80	7½
Cement	500 barrels	100	1,200	80	7½
Crate material	50,000 packages	250	7,500	80	7½
Fertilizer	3,000 sacks	300	12,000	80	7½
Fish	8,000 pounds	800	48,000	80	7½
Grain	9,000 sacks	450	20,250	80	7½
Hay	2,400 bales	120	2,160	80	7½
Hides and skins	3,500 packages	50	3,250	80	7½
Logs, pine	7,500,000 feet b. m.	18,750	65,625	80	7½
Pine	120,000 feet b. m.	300	2,400	80	7½
Merchandise	950 tons	950	95,000	80	7½
Naval stores	2,000 barrels	500	32,500	80	7½
Oranges and grape fruit	7,500 boxes	300	12,000	80	7½
Vegetables	5,000 crates	125	128,125	80	7½
Total		[a] 23,130	448,610		

[a] Various items closely estimated by merchants and steamboat men.

Number of regular steamers in trade, 2.

Estimated percentage of trade carried by water, 100 per cent when stage of water permits.

Probable increase of trade were the improvement completed: A guaranteed navigable stage of water throughout the entire year would increase the trade at least double.

Effect of improvement on freight rates, none. There is no rail competition.

Probable effect of further improvement will reduce water rates very much.

Transportation business established during 1909, none.

Transportation business abandoned during 1909, none.

All navigation is suspended from two to four months during low-water stage.

P 10.

IMPROVEMENT OF ORANGE RIVER, CHARLOTTE HARBOR, AND CALOOSAHATCHEE RIVER, FLORIDA.

These improvements were consolidated by the river and harbor act of June 13, 1902. On March 17, 1909, the sum of $1,000 was allotted from the appropriation made in the river and harbor act of March 3, 1909; $600 of this sum was allotted for the improvement of Orange River, and $400 for the improvement of Caloosahatchee River.

(A) ORANGE RIVER.

No work was done during the fiscal year.

The river and harbor act of June 25, 1910, appropriated $1,500 for the maintenance of this improvement. It is proposed to expend the available balance in snagging and cutting overhanging trees, maintaining the improved condition of the stream.

For further information see current summary, page 420.

APPROPRIATIONS.

June 13, 1902 (allotted)	$2,000
March 3, 1905 (allotted)	1,000
March 2, 1907 (allotted)	1,000
March 3, 1909 (allotted)	600
June 25, 1910	1,500
Total	6,100

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered steamers	166	166	13,280	385
Unregistered barges	216	216	13,176	

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Brick	100,000	200	$4,000	9	
Building material	160 cases	8	1,440	9	
Cement	30 barrels	6	72	9	
Fertilizer	3,240 sacks	324	12,960	9	17
Gasoline, etc	30 barrels	6	214	9	
Grain	2,920 sacks	146	5,840	9	22
Hardware	12,000 pounds	6	600	9	22
Hay	420 bales	21	378	9	22
Logs, pine	400,000 feet b. m.	1,000	3,500	9	16
Merchandise	201,857 cases	1,061	44,690	9	22
Oranges, etc	101,238 boxes	4,050	228,000	9	28
Other fruits	500 boxes	20	600	9	28
Salt	160 sacks	8	88	9	
Shingles	73,000	18	396	9	
Vegetables	684 crates	12	1,500	9	27
Total		6,886	304,278		

Number of regular steamers in trade, 1; 2 in busy season.

Estimated percentage of total trade carried by water, 60 per cent.

Probable increase of trade were the improvement completed, 30 per cent.

Effect of the improvement on freight rates, none.

Probable effect of further improvement on freight rates, none. There is no railroad competition.

Transportation lines established during 1909, none.

Transportation lines abandoned during 1909, none.

(B) CHARLOTTE HARBOR AND CALOOSAHATCHEE RIVER, FROM PUNTA RASSA TO PUNTA GORDA, FLA.

This improvement is not considered worthy of being continued. Present depths appear to be sufficient to answer the needs of the small amount of commerce of the waterway between Punta Rassa and Punta Gorda.

APPROPRIATIONS.

As shown by House Document No. 421, Fifty-seventh Congress, second session, appropriations have been made for improving Charlotte Harbor and Peace Creek, Florida, amounting to $100,000.

For Charlotte Harbor and Caloosahatchee River, from Punta Rassa to Punta Gorda, Fla., June 13, 1902 (allotted), $6,000.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	3,224	28,474	2,400
Sailing	572	5,392	....
Unregistered: Steamers	728	364	....

NOTE.—There are in addition about one hundred small gas launches running in and out. The above includes arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Fish	7,037,538 pounds	3,519	$246,330	10	....
Gasolene	300 barrels	60	2,100	....	....
Merchandise	5,920 short tons	5,920	592,000	36	5½
Total	....	9,499	840,430	....	....

NOTE.—Of the above tonnage 5,800 tons do not enter Charlotte Harbor proper, but go from Pine Island to Fort Myers.

Number of regular steamers in trade, 2.

Estimated percentage of total trade carried by water, 100 per cent.

Probable increase of trade were the improvement completed, none.

Effect of the improvement on freight rates, none.

Probable effect of further improvement on freight rates, none. There is no railroad competition.

Transportation lines established during 1909, none.

Transportation lines abandoned during 1909, 1.

(c) CALOOSAHATCHEE RIVER, BETWEEN PUNTA RASSA AND FORT THOMPSON.

Under the allotment of $3,000 made from the emergency appropriation of the river and harbor act of May 12, 1908, and the allotment of $400 from the appropriation of March 3, 1909, work began with the U. S. dredge *Florida* at Reynolds's sawmill, on the upper river, on May 26 and ceased June 23, 1910. One hundred and ninety-three snags, 151 overhanging trees, 2,584.5 cubic yards of limestone and marl, and 1,777.7 cubic yards of sand were removed from the upper river between Reynolds's sawmill and Rope Bend, which is 4 miles below La Belle.

The dredge *Florida* proceeded to Jacksonville for repairs, arriving on July 9, 1910.

The river and harbor act of June 25, 1910, appropriated $50,000 for improving this stream, with a view to eventually providing a channel 200 feet wide and 12 feet deep over the bar at the entrance to the river and 100 feet wide and 10 feet deep thence to Fort Myers, with a turning basin at that point, at an estimated cost of $119,000, and $2,000 annually for maintenance.

The Caloosahatchee River below Fort Myers is worthy of further improvement, and the maintenance of the improvement above Fort Myers is worthy of being continued. In the upper section of the river the overhanging trees are continually falling into the stream, making very dangerous snags. No success in cleaning the river will be had until all of these trees are cut. The sum of $10,000 can be economically expended in cutting these trees and removing snags and incidental dredging operations during the fiscal year ending June 30, 1912.

For completing the improvement by dredging in the lower river along the lines of the project adopted June 25, 1910, $69,000 will be required for expenditure during the fiscal year ending June 30, 1912.

For further information see current summary, page 420.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$69,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Under the original project appropriations have been made for the work as shown by House Document No. 421, Fifty-seventh Congress, second session, amounting to $33,600.

June 13, 1902 (allotted)	$1,500.00
March 3, 1905 (allotted)	2,000.00
February 24, 1906 (allotted from emergency appropriation, river and harbor act of Mar. 3, 1905)	2,000.00
March 3, 1905	2,000.00
March 3, 1909 (allotted)	400.00
May 12, 1908 (allotted from emergency appropriation, river and harbor act of Mar. 2, 1907)	3,000.00
Receipts from sales	1.05
June 25, 1910	50,000.00
Total	60,901.05

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	2,737	73,694	10,846
Sailing	152	9,688	120
Unregistered	(a)		

[a] A large number of American steamers.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile
				Miles.	*Cents.*
Brick	30,000	75	$1,500	50	
Building material	400 cases	20	360	50	
Cattle	5,020 head	1,306	78,360	(a)	
Cement	105 barrels	21	210	50	
Crate material	250,000 packages	1,250	37,500	50	2.0
Fertilizer	24,875 sacks	2,485	90,400	50	3.0
Fish	2,000,000 pounds	1,000	60,000	(b)	No rate.
Flour	430 barrels	86	5,160	50	
Gasoline, etc	716 barrels	144	4,728		
Grain	21,420 sacks	1,076	42,110	50	6.0
Groceries and provisions	64,766 cases	5,336	332,888	50	6.0
Hay	4,220 bales	211	3,798	50	
Lumber, pine	418,000	1,045	9,582	50	
Machinery	100 tons	100	50,000	50	
Merchandise	317,799 packages	2,702	364,827	50	6.0
Naval stores	1,200 barrels	300	29,100		
Oranges, etc	179,200 boxes	7,168	430,080	50	5.0
Other fruits	6,525 boxes	261	7,830	50	5.0
Salt	900 sacks	45	495	50	
Shingles	1,073,000	260	5,720	50	
Sugar	150 barrels	25	2,575	50	
Sirup	205 barrels	41	3,075	50	
Vegetables	19,640 crates	491	60,375	50	4.8
Total		25,448	1,620,673		

[a] Exported.

[b] Local.

NOTE.—Add to the above, the commerce of Orange River which passes over the river to Fort Myers. This commerce for 1909 was 6,886 tons, value $304,278.

Number of regular steamers in trade, 7.

Estimated percentage of total trade carried by water, 25 per cent.

Probable increase of trade were the improvement completed, 100 per cent.

Effect of the improvement on freight rates, none.

Probable effect of further improvement on freight rates. A 12-foot channel to the Gulf of Mexico would materially reduce through rates. Local rates would not be effected.

Transportation lines established during 1909, none.

Transportation lines abandoned during 1909, none.

P II.

IMPROVEMENT OF SARASOTA BAY, FLORIDA.

With the allotment of $5,000 made March 17, 1909, from the appropriation made in the river and harbor act of March 3, 1909, and the allotment of $4,000 made December 31, 1909, from the appropriation made in the emergency river and harbor act of March 3, 1909, work began with the government dredge *Suwanee* September 20, 1909, and continued until March 11, 1910. With these two allotments the projected depth of the channel was restored in the vicinity of the Mangroves and White Beach, and the channel in Little Sarasota Bay was made available for commerce. A total of 44,698.3 cubic yards of material was removed at a total cost of $8,136.34, or 18.2 cents per cubic yard, including engineering and contingencies.

The river and harbor act of June 25, 1910, appropriated $30,000 for completing this improvement and for maintenance.

For further information, see current summary, page 422.

APPROPRIATIONS.

September 19, 1890	$5,000.00
July 13, 1892	2,500.00
August 18, 1894	2,500.00
June 3, 1896	2,500.00
March 3, 1899	5,000.00
June 13, 1902	5,000.00
March 3, 1905	5,000.00
January 27, 1906 (allotted from emergency appropriation, river and harbor act of March 3, 1905)	5,000.00
Sale of old material	42.75
March 2, 1907	22,500.00
March 2, 1907 (allotment of Nov. 2, 1908, from emergency appropriation)	3,000.00
March 3, 1909	5,000.00
March 3, 1909 (allotment of Dec. 31, 1909, from emergency appropriation)	4,000.00
June 25, 1910	30,000.00
Total	97,042.75

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	312	13,416	2,500
Sailing	[a]800	32,000	
Unregistered:			
Steamers	[a]400		
Sailing	[a] 5,000	20,000	

[a] Estimated.

NOTE.—The above includes arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
			Dollars.	*Miles.*	*Cents.*
Bananas	1,000 bunches	25	1,750	52	....
Brick	140,000	350	7,000	52	....
Building material	6,650 cases	350	63,000	52	....
Cement	3,500 barrels	700	7,000	52	4.4
Coal	25 tons	25	125	52	....
Fertilizer	30,000 sacks	3,000	96,000	52	2.5
Fish	3,500,000 pounds	1,750	105,000	52	....
Gasoline, etc	27,000 barrels	5,400	127,800	52	....
Grain	32,000 sacks	1,600	64,000	52	3.0
Hardware	450 tons	450	45,000	52	7.3
Hay	70,000 bales	3,500	63,000	52	4.0
Ice	1,500 tons	1,500	7,500	52	....
Lumber, pine	525,000 feet b. m	1,325	11,500	52	....
Merchandise	87,368 cases	1,912	402,880	52	7.3
Naval stores	5,600 barrels	1,120	54,240	52	....
Oranges, etc	49,000 boxes	1,960	78,400	52	6.7
Other fruits	2,000 boxes	150	9,000	52	6.7
Oysters	4,500 barrels	300	13,500	52	....
Salt	1,500 sacks	75	825	52	....
Sand, building	2,000 cubic yards	2,500	2,500	52	....
Shingles	500,000	125	2,750	52	....
Sugar	600 barrels	100	10,000	52	....
Vegetables	25,000 crates	625	78,125	52	9.2
Total	....	28,842	1,250,895	....	....

Number of regular steamers in the trade, 1.

Percentage of total trade of neighborhood carried by water, 85 per cent along the coast.

Probable increase in trade were the improvements completed, 10 per cent.

Effect of the improvement on freight rates, rates have been kept down equal to boat rates.

Probable effect of further improvement, none.

Transportation business established during 1909, none.

Transportation business abandoned during 1909, none.

P 12.

IMPROVEMENT OF MANATEE RIVER, FLORIDA.

Work continued with the government dredge *Florida* on the river above Rocky Bluff until January 31, 1910. Dredging was resumed at the mouth of the river February 9, 1910, and continued until April 10. The dredge left to begin work at Crystal River April 8, 1910; 182,471.6 cubic yards of material, including some rock, marl, and clay, was removed, and 15 channel marks were established in the river above Rocky Bluff, and 52,615.1 cubic yards of material was removed from the channel near the mouth, and 6 channel marks were establish between Rocky Bluff and the mouth of the river—a total of 21 channel marks were established, and 235,086.7 cubic yards of material was removed during the year, at a total cost of $26,234.37, including incidentals, or 11.16 cents per cubic yard. The field cost was $24,358.79, or 10.36 cents per cubic yard.

As a result the channel through the shoal near Sneads Point was widened to 120 feet and deepened to a least depth of 10 feet, and cut was made through the shoal near Shaws Point, on the opposite (south) side of the river, 120 feet wide and 10 feet deep. From this point to Rocky Bluff previous work had secured a channel 100 feet wide and 10 feet deep. The work in the upper river between Rocky Bluff and Rye was completed and a turning basin was provided at Rye. This portion of the channel is 60 feet wide and 6 feet deep, and the turning basin is of sufficient dimensions for boats 125 feet long to turn in.

It is difficult to state whether or not the project has been completed. The work on the bar at mouth of the river included in the project has perhaps never been completed to full width and depth, or if it was the necessary maintenance work has not been done upon it to make it available with the other work in the river. The project is entirely complete above the mouth and the projected depth is available at the close of the fiscal year.

Redredging on the bar is needed to secure the old depths, and some small maintenance work will be required in the upper river. It is estimated that with the expenditure of $15,000 for maintenance dredging the projected depth can be again secured and maintained during the fiscal year ending June 30, 1912.

For further information, see current summary, page 424.

APPROPRIATIONS.

August 2, 1882	$12,000.00
August 5, 1886	11,000.00
August 11, 1888	5,000.00
September 19, 1890	6,000.00
July 13, 1892	6,000.00
August 18, 1894	3,000.00
June 3, 1896 ($3,000 for Terra Ceia Cut-off)	4,000.00
March 3, 1899 ($8,000 for Terra Ceia Cut-off)	10,000.00
June 13, 1902 (allotted for Terra Ceia Cut-off)	2,342.00
March 3, 1905	10,000.00
Sale of old material	8.80
March 2, 1907	70,710.00
March 3, 1909	10,000.00
Total	150,060.80

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	1,764	146,672	18,300
Sailing	50	9,600	....
Unregistered:			
Steamers	[a] 2,000	6,000	....
Lighters	80	2,400	....

[a] Estimated.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Brick	45,000	110	$2,200	35	....
Cement	1,095 barrels	219	2,400	35	....
Cross-ties	6,000	600	3,000	35	....
Fertilizer	23,090 sacks	2,309	92,360	35	3.7
Fuller's earth	191,895 sacks	16,022	320,440	35	3.1
Gasoline	19,220 barrels	3,844	134,540	35	....
Grain	6,400 sacks	320	12,800	35	4.6
Pine	442,000 feet	1,105	11,050	35	....
Machinery	212 tons	212	212,000	35	....
Merchandise	370,440 packages	12,348	123,480	35	12.0
Naval stores	2,916 barrels	729	47,385	35	6.6
Oranges	465,325 boxes	18,613	1,116,780	35	10.0
Fruits	520 barrels	40	2,600	35	....
Shingles	360,000	90	2,070	35	....
Vegetables	598,840 crates	14,971	1,871,375	35	....
Total	1,680,806	71,532	3,954,480	....	....

Number of regular steamers in the trade, 2.
Estimated percentage of total trade carried by water, 40 per cent.
Probable increase of trade were the improvement completed, 50 per cent.
Effect of the improvement on freight rates, none.
Probable effect on freight rates: Will reduce rate 25 to 40 per cent.
Transportation lines established during 1909, none.
Transportation lines abandoned during 1909, 1.

P 13.

IMPROVEMENT OF TAMPA BAY, FLORIDA.

Work was in progress with the government dredge *Key West* at the beginning of the fiscal year and continued until September 28, 1909. The dredge left for Key West, Fla., September 28, for repairs. From section E 116,396 cubic yards of material was removed and 48,753 cubic yards from section D, a total of 165,149 cubic yards. The total expenditure on this work during the fiscal year was $16,772.75, or 10.16 cents per cubic yard. The field cost was $8,149.64, or 4.94 cents per cubic yard.

Section D was completed to a least depth of 26 feet for a least width of 100 feet and section E to the same depth for the full width of 300 feet.

The river and harbor act of June 25, 1910, appropriated $9,000 for the maintenance of this improvement, which, together with the available balance, it is proposed to expend in maintenance dredging. A similar sum will be required for maintenance during the fiscal year ending June 30, 1912.

For further information see current summary, page 425.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement [a] $9,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Under previous projects appropriations have been made as shown by House Executive Document No. 421, Fifty-seventh Congress, second session, amounting to $130,000.

Under present project—	
March 3, 1899	$75,000.00
June 6, 1900	135,000.00
March 3, 1901	127,000.00
June 28, 1902	86,675.00
March 3, 1903	186,337.76
Under present project—Continued.	
Receipts from sales	$11.70
March 3, 1909	20,000.00
June 25, 1910	9,000.00
Total	639,024.46

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	[a] 578	[a] 500	[a] 1,078	2,456,400	20,144
Sailing	102	80	182	168,800	....

[a] Total accurate, but division estimated.

NOTE.—The above includes arrivals and departures.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Crude petroleum	765,135 barrels	153,027	$3,825,675
Cattle	481 head	132	14,430
Cement	1,000 barrels	200	2,000
Cigars	3,591 cases	143	1,077,300
Coal	73,011 tons	73,011	320,296
Fertilizer	4,903 sacks	490	9,806
Flour	21,557 barrels	2,112	129,042
Gasoline, etc	22,575 barrels	4,515	112,875
Grain	27,472 sacks	1,373	43,950
Groceries, etc	49,255 cases	1,601	208,659
Lumber, pine	5,675,822 feet b. m.	14,321	113,500
Merchandise	47;823 cases	739	85,415
Naval stores	60,047 barrels	14,681	674,650
Phosphate	1,077,959 tons	1,077,959	3,389,795
Salt	8,534 sacks	427	4,267
Shingles	538,700,000	129	12,250
Sugar	9,102 barrels	1,547	136,530
Tobacco	52,648 boxes	2,612	7,789,175
Vegetables	1,910 crates	48	2,865
Various fruits	1,460 crates	46	3,595
Total		1,349,113	17,956,075

NOTE.—For lower Tampa Bay add to the above the commerce of Hillsboro Bay.

This commerce for 1909 was 718,005 tons; value, $24,870,448.
Number of regular steamers in trade, 2.
Estimated percentage of total trade carried by water, 50 per cent.
Probable increase of trade were the improvement completed, none.
Effect of improvement on freight rates: Has lowered rates 20 per cent.
Probable effect of further improvement, none.
Transportation lines established during 1909, none.
Transportation lines abandoned during 1909, none.

P 14.

IMPROVEMENT OF HILLSBORO BAY, FLORIDA.

Shoaling having occurred in several places in the channel above the southern point of Seddon Island, notable where the Tampa Northern channel enters the main channel, near Big Island, in the turning basin, and at the connection with Hendry and Knights channel, limiting the navigable depth to about 19 feet, an emergency contract was entered into on November 30, 1909, with the Hillsboro Dredging Company for restoration of the projected depth, which began December 10, 1909. The soundings made in connection with this work having indicated other shoals, which could not be removed with available funds, an emergency allotment of $5,594 was made from the appropriation of $500,000 for emergencies in river and harbor works in the act of March 3, 1909, and a second emergency contract was entered into on March 9, 1910, with the Hillsboro Dredging Company for the additional work required. Under the first contract 30,185.7 cubic yards of material was removed, and 28,750.5 cubic yards under the second contract, a total of 58,946.2 cubic yards—10,879.2 cubic yards were paid for at the rate of 16 cents per cubic yard and 48,057 cubic yards at the rate of 21 cents per cubic yard. At these prices the work cost $11,832.64. The difference in prices was due to difficulty in executing the work. The sum of 16 cents per cubic yard was paid for that in the main channel and 21 cents in confined localities, where interference from navigation was very great and difficulty of finding a dumping ground required an excessively long pipe line.

As a result, the channel, turning basin, etc., were restored to their former widths and to the least depth of 20 feet at mean low water.

The river and harbor act of June 25, 1910, appropriated $300,000 for the purpose of eventually securing a channel 24 feet deep and 200 feet wide from Tampa Bay, along the line of the present channel, to the turning basin; thence easterly, 300 feet wide, to the mouth of and up the estuary to Ybor City; and from the mouth of the estuary, 200 feet wide, through the present Tampa Northern channel to the main channel, with additional widths at the turning basin, at the mouth of the estuary, and at the juncture of the Tampa Northern and main channels.

In continuing the improvement during the fiscal year ending June 30, 1912, it is believed that the sum of $600,000 can be economically expended.

For further information see current summary, page 426.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$600,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Under previous projects, as shown by House Document No. 421, Fifty-seventh Congress, second session, appropriations were made amounting to $275,000.

Present project adopted March 3, 1905:

March 3, 1905	$100,000.00
June 30, 1906, sundry civil act	348,350.00
Received from various sources prior to June 30, 1909	229.48
Receipts from sales	6.65
March 2, 1907 (allotted Dec. 17, 1908)	1,000.00
March 3, 1909	10,000.00
March 3, 1909 (allotted Dec. 6, 1909, from emergency appropriation)	5,594.00
June 25, 1910	300,000.00
Total	765,180.13

COMMERCIAL STATISTICS.

Vessel classification.

Class.	Amercian.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	2,936	18	2,954	977,958	62,759
Sailing	938	48	986	141,088	
Unregistered: Rafts	270		270		

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Brick	3,200,000	8,000	$160,000
Cement	114,380 barrels	22,876	274,512
Cigars	9,000 cases	360	3,600,000
Coal	125,000 tons	125,000	625,000
Cross-ties	370,000	37,060	141,720
Fertilizer	485,000 sacks	48,500	552,000
Fish	15,430,000 pounds	7,715	925,800
Flour	132,031 barrels	12,939	700,000
Fuller's earth	152,895 sacks	19,022	380,440
Gasoline, etc	35,000 barrels	7,000	224,000
Grain	1,155,280 sacks	57,764	1,963,996
Grape fruit, etc	345,000 crates	13,800	648,000
Groceries, etc	908,403 cases	19,659	3,111,000
Hay	182,600 bales	9,130	163,340
Logs, pine	20,716,000 feet b. m	50,933	265,000
Logs, cypress	20,400,000 feet b. m	52,200	775,742
Merchandise	2,464,087 packages	76,403	6,273,998
Naval stores	31,800 barrels	6,429	339,885
Oil, machine	10,000 barrels	200	30,000
Oysters	15,000 barrels	100	1,000
Oyster-shell paving	253,600 barrels	15,850	30,000
Phosphate rock	30,485 tons	30,485	152,425
Phosphate paving	25,000 tons	25,000	75,000
Salt	90,500 sacks	4,525	36,200
Sand, building	40,000 cubic yards	40,000	25,000
Shingles	12,000,000	3,000	90,000
Stone, building	5,000 tons	5,000	10,000
Sugar	72,000 barrels	12,000	960,009
Tobacco	3,000 boxes	15	12,000
	5,800 bales	290	962,990
Vegetables	230,000 crates	5,750	308,440
Various fruits	13,000 boxes	1,000	30,000
Total		718,005	24,850,488

Number of regular steamers in trade, 15.

Estimated percentage of total trade carried by water, 65 per cent.

Probable increase of trade were the improvement completed, 100 per cent.

Effect of improvement on freight rates, 35 per cent lower.

Probable effect of further improvement: Will reduce water rates by permitting large cargoes.

Transportation business established during 1909, 2; the Southern Steamship Company line to Philadelphia and the Troy line to Puerto Cortez.

Transportation business abandoned during 1909, 3; the steamer *Clinton* to Habana and two local boats.

Customs receipts, $1,891.836.

Internal-revenue receipts, $801.578.

Number of wholesale houses, 46; annual business, $20,000,000.

Number of factories, all kinds, 225; annual business, $30,000,000.

P 15.

IMPROVEMENT OF HILLSBORO RIVER, FLORIDA.

The river and harbor act of June 25, 1910, appropriated $25,000 for continuing the improvement on this river.

No work was done under the appropriation during the year.

For further information as to original conditions, projects, work accomplished, and commercial statistics see current summary, page 426, under heading "Hillsboro Bay."

P 16.

IMPROVEMENT OF CLEARWATER HARBOR AND BOCA CEIGA BAY, FLORIDA.

The river and harbor act of June 25, 1910, appropriated $29,500 for improving the channel from Clearwater Harbor through Boca Ceiga Bay to Tampa Bay, Florida, in accordance with report submitted in House Document No. 1190, Sixtieth Congress, second session, which contemplates a channel 5 feet deep and 50 feet wide from Clearwater Harbor to Boca Ceiga Bay and thence 100 feet wide and 7 feet deep to Tampa Bay, at an estimated cost of $59,000, with $3,000 annually for maintenance.

No work has yet been done under this project.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $29, 500
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

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[a] Exclusive of the balance unexpended July 1, 1910.

P 17.

IMPROVEMENT OF CRYSTAL RIVER, FLORIDA.

This project was consolidated by the river and harbor act of June 13, 1902, with the Anclote and Suwanee rivers, and included Manatee and Withlacoochee rivers. The act of March 2, 1907, made separate provisions for Manatee and Withlacoochee rivers, and the act of June 25, 1910, made separate provision for Anclote and Crystal rivers.

With the funds available at the beginning of the fiscal year, the government dredge *Florida* began work April 18 and ceased work May 5, 1910. A channel 60 feet wide and 7 feet deep at mean low water was made through sections B, C, and D, three successive shoals between Bull Slough and the mouth of the river. The amount of material removed was 22,288.3 cubic yards. The total amount expended was $4,724.32, or 21.19 cents per cubic yard. The field cost, including repairs, was 20.1 cents per cubic yard.

The dredge *Florida* left Crystal River May 14, 1910, to proceed to work on Caloosahatchee River.

The river and harbor act of June 25, 1910, appropriated $2,000 for the maintenance of this improvement.

It is proposed to expend the available balance in maintenance of the improvement by dredging.

APPROPRIATIONS.

June 13, 1902 (allotted)	$10,000.00
March 3, 1905 (allotted)	15,000.00
Rent of dredge *Florida* (Oct., 1906)	206.72
March 3, 1909 (allotted)	3,000.00
Receipts from sales	225.00
June 25, 1910	2,000.00
Total	30,431.72

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered:		
Steamers	120	4,800
Sailing	400	16,000
Yachts	5	
Unregistered:		
Steamers[a]		
Rafts	120	

[a] Large number.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.
				Miles.
Brick	6,000	15	$600	140
Building material	200 cases	10	2,000	140
Cattle	100 head	25	2,000	140
Cement	500 barrels	100	1,125	140
Coal	10 tons	10	100	140
Cotton	10 bales	3	750	140
Cross-ties	15,000	1,875	4,500	140
Fertilizer	10,000 sacks	1,000	30,000	140
Fish and oysters	165,000 barrels	11,500	51,000	30
Gasoline and oils	450 barrels	121	3,400	140
Grain	6,000 sacks	300	12,000	140
Hay	5,000 bales	250	5,500	140
Logs, cedar	1,620,000 feet b. m.	3,375	67,500	30
Lumber, cedar	10,000 cases	225	168,000	30
Pine (export)	1,500,000 feet b. m	3,750	22,500	
Merchandise, miscellaneous	848,888 cases	6,768	315,750	140
Naval stores	18,000 barrels	4,500	150,000	140
Oranges and grape fruit	75 boxes	3	860	140
Other fruits	275 boxes	5	31,200	140
Shingles	150,000	10	600	140
Vegetables	600 crates	15	800	140
Total		33,860	870,185	

Number of regular steamers in trade, none.
Estimated percentage of total trade carried by water, 25 per cent.
Probable increase of trade were the improvement completed, 100 per cent.
Effect of the improvement on freight rates: Has lowered them.
Probable effect of further improvement: As much greater reduction.
Transportation lines established during 1909, none.
Transportation lines abandoned during 1909, none.

P 18.

IMPROVEMENT OF ANCLOTE RIVER, FLORIDA.

This improvement was consolidated by the river and harbor act of June 13, 1902, with the Crystal and Suwanee rivers, and included also the Manatee and Withlacoochee rivers. The act of March 2, 1907, made separate provision for the Manatee and Withlacoochee rivers, and the river and harbor act of June 25, 1910, made separate provision for Anclote and Crystal rivers.

With the funds remaining available at the beginning of the fiscal year, work continued with the government dredge *Suwanee* until August 30, 1909; 24,192 cubic yards of material was removed between the mouth of the river and the county bridge at Tarpon Springs, completing a channel 100 feet wide from the mouth of the river to the county bridge, 6 feet deep at mean low water to Anclote and 5 feet deep thence to the bridge, and a channel at the entrance 5 feet deep through the outer shoal, on a new and more direct line, 100 feet wide for about one-half its length and 50 feet wide through the remaining outer portion. The total amount expended during the fiscal year was $4,849.50, or 20 cents per cubic yard.

The dredge *Suwanee* left Anclote River September 4, 1909, to proceed to work in Sarasota Bay.

The river and harbor act of June 25, 1910, appropriated $14,500 for completing this improvement.

It is proposed to expend the available balance in completing the project and in maintenance.

APPROPRIATIONS.

March 3, 1899	$5,000
June 13, 1902 (allotted)	10,000
March 3, 1905 (allotted)	5,000
March 2, 1907 (allotted)	17,000
March 3, 1909 (allotted)	5,000
June 25, 1910	14,500
Total	56,500

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	268	2,620	
Sailing [a]	3,000	90,000	
Yachts [a]	1,800	72,000	
Unregistered:			
Steamers [b]			
Rafts	270		

[a] Estimated.

[b] Large number.

NOTE.—The above includes both arrivals and departures.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Fish, etc	1,600 barrels	160	$10,560	Local	No rate.
Gasoline, etc	3,750 drums	750	25,500	85 miles.	7 cents.
Logs, pine	2,700,000 feet b. m	6,750	23,625	Local	No rate.
Merchandise	6,217 tons	6,217	621,700	85 miles.	7 cents.
Oranges	1,250 boxes	50	2,000	Local	No rate.
Other fruits	250 boxes	250	10,000	do	Do.
Shingles	400,000	100	2,300		
Sponges	400,000 strings	250	750,000	Local	No rate.
Vegetables	6,600 crates	165	20,625	do	Do.
Total		14,692	1,466,310		

Number of regular steamers in trade, 1.
Estimated percentage of total trade carried by water, 50 per cent.
Probable increase of trade were the improvement completed, 100 per cent.
Effect of improvement on freight rates, lowered 20 per cent.
Probable effect of further improvement, will reduce freight rates still lower.
Transportation business established during 1909, none.
Transportation business abandoned during 1909, none.

P 19.

IMPROVEMENT OF SUWANEE RIVER, FLORIDA.

This improvement was consolidated by the river and harbor act of June 13, 1902, with the Crystal and Anclote rivers, and included also the Manatee and Withlacoochee rivers. The act of March 2, 1907, made separate provision for the Manatee and Withlacoochee rivers, and the river and harbor act of June 25, 1910, made separate provision for Anclote and Crystal rivers.

On June 27, 1910, advertisement was issued soliciting proposals for hire of dredging plant to do work proposed on this improvement with the funds available, as no government plant is available for the work. The bids are to be opened July 21, 1910.

No work was done during the year.

It is believed that with the work completed which is contemplated with the available balance that the river will be in a sufficiently good condition for the very small commerce which makes use of it, and, therefore, I am of the opinion that the locality is not worthy of improvement beyond that to be done with funds in hand.

Commercial statistics are not available for this improvement.

For further information see current summary, page 430.

APPROPRIATIONS.

June 14, 1880	$5,000.00
March 3, 1881	3,000.00
August 2, 1882	5,000.00
July 5, 1884	5,000.00
August 5, 1886	5,000.00
August 11, 1888	15,000.00
September 19, 1890	3,000.00
July 13, 1892	3,000.00
August 18, 1894	3,000.00
June 3, 1896	$3,000.00
March 3, 1899	5,000.00
June 13, 1902 (allotted)	7,658.00
March 3, 1905 (allotted)	5,000.00
For rent of dredge	78.90
March 2, 1907 (allotted)	8,000.00
Total	75,736.90

P 20.

IMPROVEMENT OF WITHLACOOCHEE RIVER, FLORIDA.

Work under contract with the Southern Dredging Company continued during the fiscal year—32,611.38 cubic yards of rock and 72.988.97 cubic yards of soft material were removed. At the contract prices, $3 per cubic yard for rock and 19½ cents per cubic yard for soft material, the cost was $112,066.99. The total amount expended during the year was $121,387.85, or $3.23 per cubic yard for rock and 22 cents per cubic yard for soft material. A channel 85 feet wide and 10 feet deep at mean low water has been obtained from the Gulf of Mexico through sections A, B, C, D, E, H, I, and J, and part of K, or to within about 1 mile of Port Inglis.

The river and harbor act of June 25, 1910, appropriated $6,000 for the maintenance of this improvement from the anchorage in the Gulf of Mexico to Pembertons Ferry, about $2,000 of which will be needed in the upper river and $4,000 in the lower.

The lower-river improvement is worthy of being maintained in its improved condition. It is not believed that any further expenditure beyond the available balance should be made on the upper river on the lines of the present project, which provides for but 2 feet of water for half the year. Such a very small depth is believed to be insufficient to transport the products of the vicinity and it is doubtful if there is sufficient need to justify a greater project.

It is not thought that any funds will be required to maintain the lower river during the year ending June 30, 1912, and for that reason no estimate of funds is submitted as an economical expenditure.

For further information see current summary, page 431.

APPROPRIATIONS.

Under previous projects appropriations were made as shown by House Document No. 421, Fifty-seventh Congress, second session, amounting to	$24,700.00
Under present project:	
June 13, 1902	15,000.00
June 13, 1902 (allotted)	5,000.00
March 3, 1905 (allotted)	15,000.00
Overpayment on voucher, fiscal year 1905	.41
March 2, 1907	65,400.00
May 27, 1908 (sundry civil act)	100,000.00
March 4, 1909 (sundry civil act)	50,000.00
June 25, 1910	6,000.00
Total	281,100.41

CONTRACT IN FORCE.

Contractor: Southern Dredging Company.

Amount and character of material: Dredging 170,000 cubic yards of soft material and 64,700 cubic yards of rock.

Prices: Soft material, 19½ cents per cubic yard; rock, $3 per cubic yard.

Date of approval: January 22, 1908.

Date of beginning work: March 28, 1908.

Date of expiration: July 28, 1909 (extended for a reasonable period).

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	4	76	80	302,800	....
Sailing	30	2	32	15,200	....
Unregistered: Steamers	[a] 1,800	....	1,800	8,000	2,080

[a] Estimated.

Note.—The above includes arrivals and departures.

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Bananas	75 bunches	2	$131
Brick	1,000	2½	50
Building material	10 cases	½	100
Cement	12 barrels	2¼	42
Coal	6,594 tons	6,594	32,970
Eggs	50 cases	1½	450
Gasolene, etc	522 barrels	104	3,862
Grain	200 sacks	10	450
Hardware	76,000 pounds	18	2,280
Ice	130 tons	130	1,300
Iron pyrites	8,001 tons	8,001	30,005
Logs, cedar	110,000 feet b. m	220	16,500
Lumber, pine	172,000 feet b. m	431	4,312
Machinery	68 tons	68	34,000
Merchandise	1,950 cases	87	13,331
Oranges	150 boxes	6	2,000
Phosphate	112,905 tons	112,905	1,129,050
Salt	50 sacks	2½	35
Sugar	50 barrels	8¼	1,000
Vegetables	200 crates	5	750
Total		128,599	1,272,618

Number of regular steamers in trade, 1.

Estimated percentage of total trade carried by water, 70 per cent.

Probable increase of trade were the improvement completed, 100 per cent.

Effect of improvement on freight rates, reduced 30 per cent.

Probable effect of further improvement, further reduction.

Transportation business established during 1909, 1; a small boat line between Inglis and Port Inglis.

Transportation business abandoned during 1909, none.

P 21.

REMOVING THE WATER HYACINTH FROM FLORIDA WATERS.

Work was continued on the upper portion of the Kissimmee River until July 10, 1909, when the river had risen so that further work was impracticable.

The work of clearing the St. Johns River and its tributaries began July 22, and was in progress until the end of December, 1909.

On September 22, 1909, authority was given for the construction of a hyacinth elevator, consisting of a catamaran scow equipped with an inclined conveyor driven by a gasoline engine. The machine was completed and began work in Black Creek November 24, 1909. During December, 1909, the Government steamer *Captain Maguire*, with the hyacinth elevator, was engaged in clearing the St. Johns River of water hyacinths in the vicinity of Palatka. It is estimated that 156 acres of the plant were disposed of in this manner.

On January 18, 1910, authority was given to make certain alterations and repairs to the steamer *Captain Maguire*. This work was begun January 25 and was completed in May, 1910. Gasoline motive power was substituted for steam.

The river and harbor act of June 25, 1910, appropriated $5,000 for the removal of the water hyacinth from the navigable waters of the State of Florida, so far as it is or may become an obstruction to navigation.

For further information, see current summary, page 433.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Act of March 3, 1899:	
For construction of boat	$25,000.00
For log booms	1,000.00
For operating expenses	10,000.00
Act of June 13, 1902:	
For the removal of water hyacinth from the navigable waters of the States of Florida, Texas, and Louisiana, $50,000; allotted for Florida	25,000.00
Emergency river and harbor act of April 28, 1904	25,000.00
Act of March 3, 1905:	
For removing the water hyacinth from the navigable waters of Florida	25,000.00
Receipts from sales and rent of steamer *Captain Maguire*	416.80
March 2, 1907	15,000.00
June 25, 1910	5,000.00
Total	131,416.80

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[a] Exclusive of the balance unexpended July 1, 1910.

APPENDIX Q.

IMPROVEMENT OF RIVERS AND HARBORS IN THE MONTGOMERY, ALABAMA, DISTRICT.

REPORT OF CAPT. H. B. FERGUSON, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDED JUNE 30, 1910.

IMPROVEMENTS.

1. **Carrabelle Bar and Harbor, Florida.**
2. **Apalachicola Bay, Florida.**
3. **Apalachicola River, Florida, including the cut-off, Lee Slough, Lower Chipola River, and the Upper Chipola River from Marianna to its mouth.**
4. **Flint River, Georgia.**
5. **Chattahoochee River, Georgia and Alabama.**
6. **Channel from Apalachicola River to St. Andrews Bay, Florida.**
7. **St. Andrews Bay, Florida.**
8. **Choctawhatchee River, Florida and Alabama.**
9. **Holmes River, Florida, from Vernon to its mouth.**
10. **The narrows in Santa Rosa Sound, Florida.**
11. **Blackwater River, Florida.**
12. **Harbor at Pensacola, Florida.**
13. **Escambia and Conecuh rivers, Florida and Alabama.**
14. **Alabama River, Alabama.**
15. **Coosa River, Georgia and Alabama.**
16. **Operating and care of canals and other works of navigation on Coosa River, Georgia and Alabama.**

United States Engineer Office,
Montgomery, Ala., July 15, 1910.

Sir: I have the honor to forward herewith * * * annual report * * * of the river and harbor works under my charge for the fiscal year ended June 30, 1910. * * *

Very respectfully,

H. B. Ferguson,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

Q 1.

IMPROVEMENT OF CARRABELLE BAR AND HARBOR, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

The only work performed was a survey from the anchorage to the town of Carrabelle. The depth of the river channel was found to be 12 feet, and from the turn to the anchorage 16 feet. The depths on the outer and inner bars remain as left by the dredge *Caucus* in May, 1909, viz, 22 feet on the outer bar and 21.5 feet on the inner bar.

RECOMMENDATIONS.

The funds available should complete the project and provide for maintenance until the end of the fiscal year 1912. The turning basin and 18-foot channel thereto will be of no value until the railroad wharf is completed.

No additional funds are recommended.

APPROPRIATIONS.

To March 3, 1899 (p. 245, H. Doc. No. 421, 57th Cong., 2d sess.)	$20,000.00
June 6, 1900 (allotment August 25, 1900)	1,700.00
June 6, 1900 (allotment May 13, 1901)	4.08
June 13, 1902	20,000.00
June 13, 1902 (allotment June 25, 1904)	7,500.00
April 28, 1904 (allotment November 14, 1904)	5,000.00
March 3, 1905	15,000.00
March 2, 1907	60,000.00
March 2, 1907 (allotment January 28, 1909)	10,000.00
March 3, 1909 (allotment March 16, 1909)	15,000.00
March 3, 1909 (allotment May 31, 1910)	15,000.00
June 25, 1910	25,000.00
Total	194,204.08

FREIGHT TRAFFIC.

The commerce of this port is so combined with that of Apalachicola that a separation is impossible, and reference is made to report upon the improvement of harbor at Apalachicola Bay, Florida, for detailed statistics.

Q 2.

IMPROVEMENT OF APALACHICOLA BAY, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Work consisted in repairs to bulkhead, redredging in channel through bar at mouth of river, and surveys of bar at mouth of river, Link channel, and West Pass. Repairs to bulkhead were completed, 1,655 linear feet being practically rebuilt and strengthened by placing oyster shells alongside, at a total cost of $9,944.69. Dredge *No. 4*, from Chattahoochee River improvement, dredged a cut 40 feet wide to a depth of 11 feet, for a length of 1,650 feet, removing about 11,000 cubic yards, at a cost of 32 cents per cubic yard. Work was suspended on May 28, 1910, owing to lack of funds.

Surveys showed inner bar to have shoaled from 11 to 6.4 feet; Link channel remained 18 feet deep; at West Pass the west bank advanced eastward; old channel, left by dredge *Charleston* 17.6 feet deep in 1906, was 8.5 feet deep. New channel, now lighted, has least depth of 12.5 feet.

RECOMMENDATIONS.

Channel through bar at mouth of river and through West Pass should be maintained at 10 feet for coastwise boats. No further recommendation is made for West Pass, pending results of examination provided by recent river and harbor act.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$10,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.	

APPROPRIATIONS.

To December 31, 1902 (p. 244, H. Doc. No. 421, 57th Cong., 2d sess.)[b]	$233,350.29
June 13, 1902 (allotment May 25, 1906)	3,000.00
April 28, 1904 (allotment May 31, 1904)	12,500.00
April 28, 1904 (allotment September 14, 1904)	5,000.00
March 3, 1905	40,000.00
March 3, 1905 (allotment November 15, 1905)	7,500.00
March 3, 1905 (allotment March 22, 1906)	2,500.00
March 2, 1907	85,000.00
March 3, 1909 (allotment March 24, 1909)	20,000.00
June 25, 1910	22,500.00
Total	431,350.29

COMMERCIAL STATISTICS, PORT OF APALACHICOLA, FLA., FROM JULY 1, 1909, TO JUNE 30, 1910.

Exports to foreign ports	$205,346
Exports to coastwise ports	1,200,000
Total	1,405,346

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Of this amount $650.29 was for surveys of East Pass, and is not included in expenditures for Apalachicola Bay.

Freight traffic.

	Number.	Tons.
Vessels entered from foreign ports	41	19,960
Vessels entered from coastwise ports (estimated)	142	63,384
Total	183	83,344
Vessels cleared for foreign ports	34	14,308
Vessels cleared for coastwise ports (estimated)	141	61,257
Total	175	75,565
Vessels engaged in traffic of the port:		
Steam	48	4,810
Sail	156	1,572
Total	204	6,382

Amount of fees and duties paid during the year, $1,232.18.

Freight carried.

Articles.	Quantity.	Value.
Lumber feet B. M.	45,000,000	$910,000
Miscellaneous (duty added)		392,000
Total		1,302,000

This statement, obtained from the records of the custom-house at Apalachicola, Fla., includes vessels loaded from both Apalachicola and Carrabelle, Fla., all of which use the entrance at East Pass, Carrabelle Harbor. Of the total commerce probably 40 per cent should be credited to Carrabelle. In addition, there is a large commerce in fish, oysters, coal, naval stores, and miscellaneous merchandise carried in vessels not required to report at the custom-house and of which no accurate record is kept.

Q 3.

IMPROVEMENT OF APALACHICOLA RIVER, FLORIDA, INCLUDING THE CUT-OFF, LEE SLOUGH, LOWER CHIPOLA RIVER, AND UPPER CHIPOLA RIVER FROM MARIANNA TO ITS MOUTH.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

(A) APALACHICOLA RIVER.

The snag boat *Flint* removed the following obstructions:

Trees	21
Logs	16
Snags	36
Stumps	1

(B) CUT-OFF, AND LOWER CHIPOLA RIVER.

This section was cleared of obstructions and its condition permanently improved. The snag boat *Flint* removed the following obstructions:

Snags	304
Trees	1,831
Stumps	1,735
Logs	520

At a total field cost, for (A and B), of $6,808.30.

Dredge *No. 1* did the following work:

Stumps removed		101
Logs removed		23
Material dredged	cubic yards	47,497

At a field cost of $2,606.93.

(C) UPPER CHIPOLA RIVER.

No work was done.

RECOMMENDATIONS.

The Apalachicola River requires the removal of the annual accumulation of logs, snags, and overhanging trees. The cut-off, Lee Slough, and lower Chipola River require the removal of obstructions and dredging, particularly at the sharp bend and narrow places, and since there are no important landings on the corresponding section of the old river it is advisable to increase the size of the new channel as rapidly as possible.

The upper Chipola River requires the removal of snags and overhanging trees between Look and Tremble shoal and the foot of the Dead Lakes at the lower Chipola River and the dredging and regulation of a channel through the mud bar at Sister Islands. This work will open up a waterway from the Apalachicola River system to Look and Tremble shoal, about 45 miles below Marianna. To extend the improvement farther would require the construction of at least one lock and dam and very expensive channel work over rock shoals; therefore no further work than above outlined is recommended, as the river above Look and Tremble shoal is now in satisfactory condition for rafting.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Apalachicola River, including the cut-off, Lee Slough, lower Chipola River, and upper Chipola River from Marianna to its mouth.

To December 31, 1889 (p. 244, H. Doc. No. 421, 57th Cong., 2d sess.)	[a] $55,500
September 19, 1890	[a] 2,000
July 13, 1892	[a] 5,000
August 18, 1894	[a] 5,000
June 3, 1896	[a] 5,000
March 3, 1899	[a] 3,000
March 3, 1899	[b] 5,000
June 6, 1900 (allotment July 19, 1900)	[a] 1,500
June 13, 1902	[a] 6,000
June 13, 1902 (allotment May 31, 1904)	[a] 3,750
June 13, 1902	[b] 2,000
March 3, 1905	[a] 8,000
March 3, 1905 (allotment Mar. 31, 1905)	[b] 4,000
March 3, 1905 (allotment Nov. 15, 1905)	[a] 5,000
March 2, 1907	[a] 16,000
March 2, 1907 (allotment Mar. 27, 1907)	[b] 9,000
March 3, 1909 (allotment Mar. 16, 1909)	[a] 13,000
June 25, 1910	6,500
Total	155,250

FREIGHT TRAFFIC.

The commerce of this stream is chiefly cotton, naval stores, general merchandise, saw logs, and timber for export. This river runs through a section of country where there are no railroads, and the country bordering upon it depends largely on the steamboats for transportation of products and supplies. There is also a large passenger traffic on the stream.

Reference is made to report on the Flint River improvement for detailed statistics.

Q 4.

IMPROVEMENT OF FLINT RIVER, GEORGIA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Work above Bainbridge consisted in blasting through rock reefs, removing loose bowlders, widening and straightening channel previously worked over, and deepening minor reefs. Summary of work done by drilling barge *No. 16* and grapple dredge *No. 5* follows:

Locality.	Character of work.	Miles from Albany.	Cubic yards.
Teacup shoals	Rock excavation	17	98
Newton shoals to Keaton shoals	do	35-44	12,711
Total			12,809

At a field cost of $9,219.93, or 71 cents per cubic yard.

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[a] Exclusive of upper Chipola River. [b] For upper Chipola River only.

Below Bainbridge the snag boats, *Flint* and *Chattahoochee* removed the following:

Bowlders	31
Snags	18
Logs	2
Stumps	16
Trees	2

At a field cost of $1,335.37.

New quarter boat was completed at a cost of $5,220.85.

Snag boat *Thronateeska* was repaired, at a cost of $1,440.94.

RECOMMENDATIONS.

It is recommended that work be confined to the river below Albany, Ga., and include the enlargement of channels through rock reefs and the removal of bowlders between Newton and Bainbridge, the removal of isolated bowlders below Bainbridge, and such snagging operations as may be required for maintenance. It is proposed to apply the available balance and the funds recommended in continuing such work.

This river is, in my opinion, worthy of improvement to the above extent, which will permit light-draft boats to operate from Albany to the mouth of the river.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$12,500	
For maintenance of improvement	2,500	
		[a] $15,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1879 (p. 249, H. Doc. No. 421, 57th Cong., 2d sess.)	$35,000
June 14, 1880	20,000
March 3, 1881	15,000
August 2, 1882	25,000
July 5, 1884	20,000
August 5, 1886	20,000
August 11, 1888	20,000
September 19, 1890	20,000
July 13, 1892	15,000
August 18, 1894	8,000
June 3, 1896	8,000
March 3, 1899	5,000
June 13, 1902	25,000
March 3, 1905	20,000
March 2, 1907	25,000
March 3, 1909 (allotment Apr. 9, 1909)	25,000
June 25, 1910	25,000
Total	331,000

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

The commerce of this stream is principally cotton, naval stores, and lumber. There are great quantities of fine timber along the banks of the river, mainly pine, cypress, and hard wood. When the river is made navigable from Albany to Bainbridge the entire year it will greatly benefit these industries and new ones will spring up along the stream.

Above Bainbridge the commerce during the calendar year 1909 is reported as follows:

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Estimated average haul or distance freight was carried (miles).	Rate per ton-mile.
Manufactured iron and steel	2,900 packages	128	$7,232	35	$0.0075
Brick	155,000	388	1,280	35	.0075
Lumber	300,000 feet	600	6,000	35	.0050
Ties, cross	2,000	180	594	35	.01
Shingles	600,000	180	2,343	35	.0050
Naval stores	9,131 barrels	2,032	238,840	35	.0075
Grain	15,020 sacks	991	47,818	35	.0050
Cotton	2,500 bales	625	150,000	35	.01
Cotton seed	13,100 sacks	605	15,390	35	.00875
Fertilizer	20,000 sacks	2,000	47,000	35	.0075
Hay	5,200 bales	260	5,200	35	.0075
Salt	1,000 sacks	100	2,000	35	.0050
Sugar	500 barrels	100	12,000	35	.01
Merchandise	139,330 packages	21,408	2,140,428	35	.01
Flour	1,500 barrels	147	9,555	35	.0075
Miscellaneous	657 packages	65	6,885	35	.0231
Total		29,809	2,692,565		

Between Bainbridge and the mouth of the river the stream is used by steamers plying the Chattahoochee, Apalachicola, and Chipola rivers, and for the commerce of this entire system for the calendar year 1909 reference is made to the following table, compiled from various reports received:

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Estimated average haul or distance freight was carried (miles).	Rate per ton-mile.
Manufactured iron and steel	3,000 packages	125	$7,100	200	$0.0075
Brick	530,000	1,375	4,400	200	.0075
Lumber	977,000 feet	1,954	19,540	300	.0050
Shingles	3,245,000	973	12,649	300	.0050
Naval stores	64,730 barrels	15,629	973,640	150	.0075
Grain	79,045 sacks	4,762	203,599	300	.0050
Cotton	14,495 bales	3,624	869,760	200	.01
Cotton seed	167,740 sacks	8,387	206,082	175	.00875
Fertilizer	64,315 sacks	6,432	151,152	200	.0075
Hay	25,000 bales	1,250	25,000	300	.0075
Live stock	434 head	217	43,400	200	.04
Salt	10,000 sacks	1,000	20,000	300	.0050
Sugar	1,800 barrels	360	43,200	250	.01
Merchandise	509,555 packages	73,234	7,348,522	264	.0096
Flour	6,000 barrels	638	41,470	250	.0075
Molasses	5,750 barrels	1,150	143,750	250	.0125
Miscellaneous	1,296 packages	80	9,000	200	.015
Total		121,190	10,122,564		

In addition to the above, large quantities of timber are carried down these streams in rafts to sawmills at Apalachicola and Carrabelle, Fla., for which no value is given, but it is included in the general value of the commerce reported for Apalachicola and Carrabelle.

Q 5.

IMPROVEMENT OF CHATTAHOOCHEE RIVER, GEORGIA AND ALABAMA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

By dredging and jetties, a depth of 4 feet was maintained from Columbus to Eufaula, a distance of 84 miles. Necessary snagging was done on the entire navigable river, 223 miles.

Jetties were built and repaired (10,162 linear feet, at a field cost of $3.30 per linear foot) as follows:

Locality.	Miles below Columbus.	Built.	Repaired.
		Linear ft.	*Linear ft.*
Hospital shoals	1.5	....	226
Gin House Bend	6.0	1,525	....
Jenny's Island	6.5	3,154	478
Snake shoals	32.0	650	58
Jernigan's	53.0	1,694	....
Rood's Bend	66.0	703	....
Francis Bend	78.0	1,363	....
Perriman's reach	79.0	940	....
Total	....	10,029	762

The snag boats *Chattahoochee* and *Flint* removed 1,302 snags, 512 stumps, and cut and trimmed 6,517 trees, at a field cost of $3,569.83.

Dredge *No. 1* (dipper) excavated 39,245 cubic yards of gravel and marl, at a field cost of $3,607.45, or 10 cents per cubic yard.

Dredge *No. 4* (12-inch hydraulic) removed 14,203 cubic yards of gravel, at a field cost of $2,062.79, or 14½ cents per cubic yard.

Extensive additions and repairs to plant were made as follows:

Rebuilding hull for dredge *No. 1* was completed and machinery installed, at a cost of $5,683.96 for this year's work.

Four small barges for pile driver were rebuilt, at a total cost of $3,000.

One large barge, 125 feet by 28 feet, was about 80 per cent completed, at a cost of $2,560.14.

Two large creosoted barges were built for this river by the New Orleans office (Mississippi River Commission), the cost, including delivery, being $8,502.87.

New boiler and condenser were installed on dredge *No. 4*.

Snag boats *Chattahoochee* and *Flint* were repaired at Apalachicola, at costs of $6,102.24 and $2,271.59, respectively.

Miscellaneous repairs to plant were made to the extent of $2,494.74.

RECOMMENDATIONS.

The remaining permanent works of considerable extent now apparent above Eufaula are at Gun Island and Woolfolk's bar, 7 and 9 miles, respectively, below Columbus, and should be completed with funds on hand.

The system of jetties should be extended downstream from Eufaula and maintained; dredging should be done in connection with the works of regulation where required, and the river throughout its length should be kept free from snags and similar obstructions.

It is proposed to apply the available balance and the funds recommended as follows:

Operating snag boat	$10,000
Operating 2 dredges	15,000
Building works of contraction	40,000
Repairing plant	10,000
Total	75,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$50,000	
For maintenance of improvement	25,000	
		[a] $75,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

February 24, 1835		$2,000.00
June 23, 1874 March 3, 1875 August 14, 1876		[b] 52,000.00
June 18, 1878		18,000.00
March 3, 1879		15,000.00
June 4, 1880		20,000.00
March 3, 1881		20,000.00
August 2, 1882		25,000.00
July 5, 1884		35,000.00
August 5, 1886		20,000.00
August 11, 1888		20,000.00
September 19, 1890		20,000.00
July 13, 1892		25,000.00
August 18, 1894		30,000.00
June 3, 1896		25,000.00
March 3, 1899		[c] 50,000.00
June 13, 1902		100,000.00
Unexpended balance transferred from appropriation for Chattahoochee River between West Point and Franklin, Ga		280.78
April 28. 1904 (allotment May 31, 1904)		32,650.00
March 3, 1905		75,000.00
March 3, 1905 (allotment Nov. 15, 1906)		10,000.00
March 2, 1907		150,000.00
March 3, 1909 (allotment Apr. 9, 1909)		115,000.00
June 25, 1910		75,000.00
Total		934,930.78
Used between West Point and Franklin, Ga., appropriations of 1892, 1894, 1896, and 1899, $5,000 each	$20,000	
Appropriation of February 24, 1835, carried to surplus fund	2,000	
		22,000.00
Total		912,930.78

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] The sum expended on Chattahoochee River from joint appropriations for Chattahoochee and Flint rivers, amounting to $70,000.

[b] The sum expended on Chattahoochee River from joint appropriations for on Chattahoochee, Flint, and Apalachicola rivers, and $5,000 of the appropriation, together with unexpended balance on hand, shall be applied to survey of Chattahoochee River between West Point and Franklin, Ga.

FREIGHT TRAFFIC.

The commerce interested on this river is chiefly cotton, naval stores, and general merchandise. The river runs through a section of country where there are but few railroads (none parallel with the river), and the people depend largely on the boats for their supplies. There is also a large passenger traffic on the river.

The commercial statistics for the Chattahoochee River are so combined with those of the Flint, Apalachicola, and Chipola rivers that a separation is impracticable, and reference is made to report upon Flint River improvement for detailed statistics.

Columbus, Ga., at the head of navigation, with its magnificent water power, is rapidly becoming one of the greatest manufacturing centers of the South, and with the completion of the deep-water harbor projected at the mouth of this system of rivers the importance of this improvement will be greatly increased.

Q 6.

IMPROVEMENT OF CHANNEL FROM APALACHICOLA RIVER TO SAINT ANDREWS BAY, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

No work was done. Funds recommended are to provide for operation of first-class plant on either end of channel for one year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$250,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

June 25, 1910	$100,000

Q 7.

IMPROVEMENT OF SAINT ANDREWS BAY, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

No work was done. Funds recommended are for completing the project.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$128,560
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

June 25, 1910	$75,000

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[a] Exclusive of the balance unexpended July 1, 1910.

Q 8.

IMPROVEMENT OF CHOCTAWHATCHEE RIVER, FLORIDA AND ALABAMA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

The snag boat *Choctawhatchee* performed the following work of maintenance:

Snags removed	799
Logs removed	124
Overhanging trees removed	587
Stumps removed	4
Bulkhead at Cypress Top Outlet extended feet	117
Excavation with 6" pump at mouth of Cypress Top Outlet cubic yards	7,236

At a field cost of $4,306.11.

Works was confined to the lower 92 miles of river.

RECOMMENDATIONS.

Below Geneva, and especially below the mouth of the Holmes River, the river should be kept clear of all obstructions to provide proper facilities for the timber industry and the important commerce on the two rivers, in which several steamers are engaged.

The channel across the bar at Cypress Top should be maintained to afford proper facilities for the tugs engaged in the large lumber trade of the river.

The additional funds recommended for appropriation are for the river below Geneva, and it is proposed to apply them in removing obstructions below this point and to maintaining the channel below Holmes River.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1889 (p. 336, H. Doc. No. 421, 57th Cong., 2d sess.	$110,000.00
September 19, 1890	12,500.00
July 13, 1892	12,500.00
August 18, 1894	6,000.00
June 3, 1896	5,000.00
March 3, 1899	16,000.00
June 13, 1902	[b] 16,000.00
June 13, 1902 (allotment May 31, 1904)	3,000.00
March 3, 1905	[c] 10,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Of which $4,000 shall be used on Cypress Top Outlet.

[c] Of which $6,000 shall be expended between Newton and Geneva, Ala., and $4,000 on Cypress Top Outlet.

March 3, 1905 (allotment July 26, 1905)	$2,000.00
March 3, 1905 (allotment June 28, 1906)	300.00
March 2, 1907	10,000.00
March 3, 1909 (allotment Apr. 9, 1909)	5,000.00
June 25, 1910	[a] 5,000.00
Total	213,300.00
Carried to surplus fund (1852)	2,123.38
	211,176.62

FREIGHT TRAFFIC.

The commerce of this stream is mainly saw logs, timber, naval stores, and general merchandise, the amount of which during the year 1909, is estimated to be 21,500 tons, valued at $1,750,000, nearly all of which is below the mouth of Holmes River. In addition, the lumber trade is reported to be about $300,000, making a total of $2,050,000 for the year.

Q 9.

IMPROVEMENT OF HOLMES RIVER, FLORIDA, FROM VERNON TO ITS MOUTH.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Snagging operations were carried from the mouth of the river to Vernon, 25 miles, the head of navigation. The river is in excellent conditon.

The snag boat *Choctawhatchee* removed the following obstructions:

Snags		324
Overhanging trees		153
Stumps		6
Overhanging trees trimmed		13
Brush cut (estimated)		2,000
River worked over	miles	26

At a field cost of $683.41.

The work consisted in maintenance.

RECOMMENDATIONS.

This improvement should be maintained by the necessary snagging, and is, in my opinion, worthy of same.

Estimate of additonal funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[b] $1,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Includes Cypress Top Outlet.

[b] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

To December 31, 1887 (p. 246, H. Doc. No. 421, 57th Cong., 2d sess.)	$4,000
August 11, 1888	3,000
September 19, 1890	3,000
April 28, 1904 (allotment Aug. 3, 1904)	2,000
March 3, 1905	2,000
March 2, 1907	2,000
March 3, 1909 (allotment Apr. 10, 1909)	2,000
June 25, 1910	2,000
Total	20,000

FREIGHT TRAFFIC.

The commerce of this stream, which also forms part of the commerce of the lower Choctawhatchee River, consists of cotton, turpentine, rosin, molasses, honey, and miscellaneous articles, which are carried by water to Pensacola. Its value in 1909 is estimated at $750,000.

Q 10.

IMPROVING THE NARROWS IN SANTA ROSA SOUND, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

No work was done. Funds on hand are sufficient for completion of the project.

APPROPRIATIONS.

June 25, 1910	$24,000

Q 11.

IMPROVEMENT OF BLACKWATER RIVER, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

No work was done.

RECOMMENDATIONS.

The channel should be completed from Milton to Pensacola Bay, as projected, and then maintained. The river and harbor act of June 25, 1910, makes sufficient appropriation for this work.

APPROPRIATIONS.

To December 31, 1902 (p. 244, H. Doc. No. 421, 57th Cong., 2d sess.)	$5,000
March 3, 1905	10,000
March 2, 1907	5,000
June 25, 1910	25,000
Total	45,000

FREIGHT TRAFFIC.

The value of timber, naval stores, and general miscellaneous on this river amounts to about $2,000,000 annually. There is a dry dock at Bagdad and a marine railway at Milton, to which come many steamboats and sailing vessels owned at Pensacola. Lumber brought by rail is stored in bayou near Milton and taken to Pensacola by this waterway.

Q 12.

IMPROVEMENT OF HARBOR AT PENSACOLA, FLORIDA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Dredging was continued in the Caucus channel by the U. S. dredge *Caucus* from July 1, 1909, to October 7, 1909, on which date the main shaft was broken and the dredge was docked at the Pensacola Navy-Yard for extensive repairs. Repairs were completed May 9, 1910, and the dredge continued work until the close of the fiscal year. A total of 381,248 cubic yards of material was removed, at a field cost of 6.31 cents per yard. The cost of repairs was $58,322.74, being navy-yard expenses of $29,381.85 and labor and material by the engineer department of $28,940.89. Including these extraordinary repairs, the cost of dredging was, for the fiscal year, 21.61 cents per cubic yard and for total dredging to date (2,420,386 cubic yards), 8.66 cents per yard. This cost does not include the original cost of dredge nor any office expenses.

For new launch, about 95 per cent completed, $1,154.15 was the portion paid by this improvement.

Survey of channel was made in May, 1910. The channel is 380 feet wide, 30 feet deep, with side slopes from $\frac{1}{35}$ to $\frac{1}{45}$.

RECOMMENDATIONS.

The dredge *Caucus* should be kept at work continuously until the project has been completed. It is proposed to apply the available funds and the additional appropriations recommended to this work.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$15,000	
For maintenance of improvement	10,000	
		[a] $25,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

To December 31, 1898 (p. 246, H. Doc. No. 421, 57th Cong., 2d sess.)	$650,000.00
March 3, 1899	70,000.00
June 6, 1900 (allotment Apr. 15, 1902)	5,000.00
June 6, 1900 (allotment Aug. 18, 1902)	956.94
June 13, 1902	[a]220,000.00
March 3, 1905	100,000.00
March 2, 1907	100,000.00
March 3, 1909 (allotment Apr. 9, 1909)	110,000.00
June 25, 1910	75,000.00
Total	1,330,956.94
Receipts for salvage work by dredge *Caucus*	14,551.76
Receipts from sales	26.77
Total	1,345,535.47

CONTRACT IN FORCE.

Name of contractor: Cary & Co.
Date of contract: July 17, 1909. (Emergency.)
Date of commencement: Five days after signing contract.
Date of completion: When quantity shall have been delivered.

For 1,500 tons steam coal, more or less, on board U. S. dredge *Caucus* at Pensacola, Fla., at $3.05 per ton (long ton).

COMMERCIAL STATISTICS, PORT OF PENSACOLA, FLA., FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Freight traffic.

Exports to foreign ports	$20,960,154
Exports to coastwise ports	No record.
Imports from foreign ports	1,500,801
Duties on imports	8,835
Total	22,469,790

	Number.	Tons.
Vessels entered from foreign ports	292	514,029
Vessels entered from coastwise ports (estimated)	139	310,865
Total	431	824,894
Vessels cleared for foreign ports	337	610,008
Vessels cleared for coastwise ports (estimated)	84	183,456
Total	421	793,464
Vessels engaged in traffic of the port:		
Steam	36	2,337
Sail	94	3,429
Total	130	5,766

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[a] Includes $150,000 appropriated for construction of seagoing dredge and $26,000 allotted by the Chief of Engineers for the same purpose.

Freight carried.

Articles.	Quantity.	Value.
Lumber ... feet B. M.	183,858,000	$3,348,345
Cotton ... bales	103,481	10,697,510
Miscellaneous (duty added)		6,923,134
Total		20,968,989

Amount of fees, dues, and duties paid during the year, $31,262.

Q 13.

IMPROVEMENT OF ESCAMBIA AND CONECUH RIVERS, FLORIDA AND ALABAMA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

General improvement.—The snag boat *Escambia* worked over 82 miles of river, performing the following work:

Snags removed	463
Overhanging trees removed	451
Old barge, 70 by 30 by 5 feet, removed.	
Trees cut up on bank	52

At a field cost of $1,926.94.

Conecuh River.—The snag boat *Escambia* and barge *No. 22* worked over 125 miles of river, performing the following work:

Snags removed	3,069
Overhanging trees removed	1,860
Logs removed	417
Old piles removed	187
Stumps removed	38
Gravel and sand removed ... cubic yards	178
Overhanging trees trimmed	31
Logs removed from bank	667
Stumps on bank cut level	96

At a field cost of $6,809.56.

RECOMMENDATIONS.

The project is completed. The river is now in good condition for logging and towing of rafts. Funds recommended are for maintenance by necessary snagging and dredging.

GENERAL IMPROVEMENT.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

To December 31, 1881 (p. 342, H. Doc. No. 421, 57th Cong., 2d sess.)	[a] $23,500
August 2, 1882	12,000
July 5, 1884	[a] 3,000
July 5, 1884	12,000
August 5, 1886	12,000
August 11, 1888	10,000
September 19, 1890	7,500
July 13, 1892	8,000
August 18, 1894	6,000
June 3, 1896	4,000
March 3, 1899	5,000
June 6, 1900 (allotment July 19, 1900)	1,500
June 13, 1902	5,000
March 3, 1905	10,000
March 3, 1905 (allotment Nov. 10, 1906)	5,000
March 2, 1907	15,000
March 2, 1907	[b] 31,000
March 3, 1909 (allotment Apr. 9, 1909)	5,000
June 25, 1910	5,000
	180,500
Carried to surplus fund (1838)	5,500
Total	175,000

FREIGHT TRAFFIC.

Article.	Amount in customary units.	Amount in short tons.	Valuation.	Estimated average haul or distance freight was carried (miles).	Rate per ton-mile.
Lumber	100,000,000 feet	225,000	$2,000,000	85	$0.00117

Q 14.

IMPROVEMENT OF ALABAMA RIVER, ALABAMA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

The snag boat *Wm. J. Twining* assisted in miscellaneous towing and worked over the entire river, removing the following obstructions:

Snags	717
Trees	6,175
Logs	308
Stumps	221

At a field cost of $10,313.

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[a] For Escambia River only.

[b] For Conecuh River only.

The dipper dredge removed the following quantities of stone, sand, and gravel from the channel at the points named:

Locality.	Character of material.	Cubic yards.	Cost per cubic yard.
			Cents.
Gardners Island	Sand and gravel	23,069	10.4
Do	Stone	740	45.0
Hobbs Island	Sand and gravel	4,551	12.8
Do	Stone	35	70.0

Jetties were built and the dredge *Pettus* (15-inch hydraulic) removed sand and gravel as follows:

Locality.	Miles below Montgomery.	Dredging (cubic yards).	Jetties.	
			Linear feet built.	Type.
Gause Bar	3-4½	15,082		
Gardners Island	66-66½	168,809	2,590	Soft rock to low water.
First bar above Selma	80	8,000	320	Do.
Jones Branch	86	500		
McLeods bar and below	90-91	11,515		
Watts bar	95	912	250	Pile and brush.
Kings bar	102	3,622	664	Do.
Turkey Ford bar	103	30,987	700	Rock.
Mary Taylors bar	106	15,025	620	Pile and brush.
Lenoirs bar	107½	5,575		
Lower Sisters bar	115	31,732	140	Do.
Lower Portland bar	123	13,464		
Below Hobbs Island	170		261	Do.
Total		305,173	5,545	

The average field cost was 12.6 cents per yard for dredging, and $6.51 per linear foot for jetties.

Necessary detailed surveys were made in connection with above works and at six other localities.

Pontons for pipe line were built for the dredge *Pettus*. Two creosoted barges were built for this improvement by the New Orleans office (Mississippi River Commission), at a cost, including delivery, of $8,303.19. The snag boat *Wm. J. Twining* was extensively repaired, at a cost of $6,690.38. Minor general repairs and addition to plant were made to the extent of $2,938.75.

RECOMMENDATIONS.

It is proposed to apply the available balance and the funds recommended as follows:

	Per year.
Operating one suction dredge	$40,000
Operating one dipper dredge	5,000
Operating one snag boat	20,000
Building and repairing works of contraction	50,000
Repair and care of plant	10,000
Total	125,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:

For works of improvement	$75,000	
For maintenance of improvement	25,000	
		[a] $100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1902 (p. 233, H. Doc. No. 421, 57th Cong., 2d sess.)	$415,000
June 13, 1902 (allotment May 31, 1904)	4,000
March 3, 1905	100,000
March 2, 1907	200,000
March 3, 1909 (allotment Apr. 9, 1909)	110,000
June 25, 1910	[b] 85,000
Total	914,000
Received from sales	50
Aggregate	914,050

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Estimated average haul or distance freight was carried (miles).	Rate per ton-mile to Mobile.
Manufactured iron and steel	7,719 packages	1,978	$88,584	150	$0.0047
Brick	193,500	484	1,549	100	.0041
Lumber	2,742,000 feet	2,170	54,840	130	.003
Logs	4,000,000 feet b. m.	9,000	60,000	130	....
Ties, cross	6,248 pieces	562	1,855	100	.003
Shingles	801,000	240	3,120	100	.0049
Naval stores	14,718 barrels	3,509	248,000	60	.0047
Grain	128,271 sacks	7,870	344,852	100	.0047
Cotton	44,245 bales	11,061	2,654,700	150	.0059
Cotton seed	110,409 sacks	5,520	107,226	100	.0053
Fertilizer	169,455 sacks	16,946	398,231	100	.0063
Hay	9,686 bales	484	9,680	100	.0059
Live stock	3,436 head	172	34,400	60	.04
Salt	6,021 sacks	602	12,040	100	.0059
Sugar	4,368 barrels	874	104,880	200	.0053
Merchandise	121,160 packages	13,994	1,609,778	112	.0058
Flour	12,912 barrels	1,265	82,225	100	.0042
Miscellaneous	530,326 packages	4,650	227,190	130	.008
Total	....	85,380	6,043,140	....	....

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] In the discretion of the Secretary of War the scope of this improvement may be extended to include the Alabama and Coosa rivers between Montgomery and Wetumpka.

Q 15.

IMPROVEMENT OF COOSA RIVER, GEORGIA AND ALABAMA.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

(A) COOSA RIVER BETWEEN ROME AND THE EAST TENNESSEE, VIRGINIA AND GEORGIA RAILROAD BRIDGE.

(*a 1*) *Rome, Ga., to Lock No. 4, Alabama.*—The dipper dredge was operated throughout the season, removing from the channel 17,500 cubic yards of sand, gravel, and blasted rock, at a cost of $1,745.71, or 10 cents per yard. About 2,300 linear feet of jetties were built, at a field cost of $7,252.04, or $3.07 per foot.

The locations and details of the year's work are as follows:

Locality.	Miles below Rome, Ga.	Jetties built.	Dredging.
		Linear ft.	*Cubic yds.*
Chicken shoals	34	1,400	
Mill shoals	34		7,000
Sewell's bar	38		2,900
Chattooga bar	50	680	
Center shoals	63		7,600
Croft's shoals	81	280	
Total		2,360	17,500

Survey in vicinity of Locks Nos. 12, 14, and 15 was completed. The cost charged to this improvement was $10,964.56.

Survey was made of river from Lock No. 3 to Lock No. 4.

New boiler was purchased for $1,390 and installed on dredge.

(*a 2*) *Lock and dam at Mayo's bar.*—No work was done.

(*a 3*) *Lock No. 4 and site for Dam No. 5.*—No work was done.

RECOMMENDATIONS.

It is proposed to apply the available balance and the funds recommended to the construction of additional plant, and (1) the further improvement and maintenance of the channel between Rome, Ga., and Lock No. 4, Alabama; (2) completion of lock and dam at Mayo's bar, near Rome, Ga.; and (3) completion of Lock No. 4 and Dam No. 5.

APPROPRIATIONS.

Between Rome, Ga., and East Tennessee, Virginia and Georgia Railroad bridge, to December 31, 1889 (p. 338, H. Doc. No. 421, 57th Cong., 2d sess.)	$523,700.00
September 19, 1890	150,000.00
July 13, 1892	130,000.00
August 18, 1894	110,000.00
June 3, 1896	50,000.00
March 3, 1899	20,000.00
June 13, 1902	35,000.00
June 13, 1902 (transferred from appropriation for section between Wetumpka and East Tennessee, Virginia and Georgia Railroad bridge)	10,000.00

June 13, 1902 (allotment May 31, 1904)		$7,500.00
March 3, 1905		25,000.00
March 2, 1907		50,000.00
March 3, 1909 (allotment Apr. 9, 1909)		40,000.00
June 25, 1910: Between Rome Ga., and Lock No. 4, Alabama	$52,500	
June 25, 1910: Lock and dam at Mayo's bar, near Rome, Ga	120,000	
June 25, 1910: Lock in Dam No. 4, and site for Dam No. 5	75,000	
		247,500.00
		1,398,700.00
Transferred from act of June 13, 1902, of $35,000, to Oostenaula and Coosawattee rivers		7,155.80
		1,391,544.20
Transferred to section between Wetumpka and East Tennessee, Virginia and Georgia Railroad bridge from acts of March 2, 1907, and March 3, 1909		4,000.00
		1,387,544.20
Receipts from sales		1,448.05
Aggregate		1,388,992.25

FREIGHT TRAFFIC.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Estimated average haul or distance freight was carried (miles).	Rate per ton-mile.
Sand and gravel		55,000	50,000	3	
Brick	64,000	160	512	60	$0.025
Lumber	700,000 feet b. m	1,750	14,000	65	.025
Logs	25,750,000 feet	58,000	38,600	30	
Ties, cross	4,746	560	1,423	75	.025
Grain	1,940 sacks	111	4,023	75	.025
Cotton	4,225 bales	1,056	253,440	75	.025
Cotton seed	3,650 sacks	242	4,935	75	.025
Fertilizer	12,100 sacks	1,210	28,435	75	.025
Merchandise	5,790 packages	576	60,725	75	.025
Flour	27,000 sacks	237	15,405	75	.025
Miscellaneous	69,150 packages	170	8,306	75	.025
Total		119,072	827,204		

(B) COOSA RIVER BETWEEN WETUMPKA AND EAST TENNESSEE, VIRGINIA AND GEORGIA RAILROAD BRIDGE.

The property belonging to the improvement was cared for. Lock-house and storehouse were painted, and minor repairs made to buildings and fences, to the extent of $1,034.54.

RECOMMENDATIONS.

The buildings at Lock No. 31 and the property stored in them need proper attention and care, for which purpose $2,000 should be provided. At present no other work is recommended, pending a decision as to the character and extent of the further improvement of the Coosa River. It is proposed to apply the additional appropriation recommended to the care and preservation of property at Lock No. 31.

APPROPRIATIONS.

Between Wetumpka and East Tennessee, Virginia and Georgia Railroad bridge:	
September 19, 1890	$150,000.00
July 13, 1892	100,000.00
August 18, 1894	110,000.00
June 3, 1896	50,000.00
March 2, 1907 (transferred from section between Rome, Ga., and East Tennessee, Virginia and Georgia Railroad bridge)	2,000.00
March 3, 1909 (allotment Apr. 9, 1909—transferred from section between Rome, Ga., and East Tennessee, Virginia and Georgia Railroad bridge)	2,000.00
	414,000.00
Transferred by act of June 13, 1902, to section between Rome, Ga., and East Tennessee, Virginia and Georgia Railroad bridge	10,000.00
	404,000.00
Receipts from sales	455.82
	404,455.82

FREIGHT TRAFFIC.

On this part of the river there is a small commerce in the rafting of logs and square timber, but this can be carried on only during the season when the river is about 12 feet above low water, and no reliable estimate of its value can be obtained.

LOCK AND DAM AT MAYOS BAR.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $121,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

LOCK NO. 4 AND SITE FOR DAM NO. 5.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $150,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

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[a] Exclusive of the balance unexpended July 1, 1910.

CONSOLIDATED.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $271,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

Q 16.

OPERATING AND CARE OF CANALS AND OTHER WORKS OF NAVIGATION ON COOSA RIVER, GEORGIA AND ALABAMA.

During the fiscal year ending June 30, 1910, the locks were operated without interruption.

An allotment of $8,025 was made during the fiscal year for the following purposes:

Salaries of lock masters	$1,800
Dredging entrances to Locks Nos. 1 and 2	1,000
Repairs to longitudinal dam at Lock No. 1	1,500
Replacing lower miter sill coping at Lock No. 1	500
Repairs to lower guide pier at Locks Nos. 1 and 2	500
Renewing upper and lower guide piers at Lock No. 3	1,200
Minor repairs to cofferdam at Dam No. 4	325
Repairs to outbuildings and fencing at Dam No. 4	1,000
Screening windows and outside doors of lock house at Dam No. 4	200
Total	8,025

All work provided for was done except repairs to longitudinal dam at Lock No. 1, which was practically completed.

Summary of expenditures made during the fiscal year ending June 30, 1910, at Locks Nos. 1, 2, 3, and Dam No. 4:

Services	$5,032.40
Material and supplies	582.25
Provisions	449.55
Total	6,064.20

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[a] Exclusive of the balance unexpended July 1, 1910.

APPENDIX R.

IMPROVEMENT OF RIVERS AND HARBORS IN THE MOBILE, ALABAMA, DISTRICT.

REPORT OF MAJ. H. JERVEY, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Harbor at Mobile, Alabama.
2. Mobile bar, Alabama.
3. Black Warrior, Warrior, and Tombigbee rivers, Alabama and Mississippi.
4. Operating and care of locks and dams on Warrior and Black Warrior rivers, Alabama.
5. Pascagoula River, Mississippi.
6. Pascagoula, Leaf, and Chickashay rivers, Mississippi.
7. Horn Island Pass, Mississippi.
8. Harbor at Biloxi, Mississippi.
9. Harbor at Gulfport and Ship Island Pass, Mississippi.
10. Wolf and Jordan rivers, Mississippi.
11. East Pearl River, Mississippi.
12. Pearl River below Rockport, Mississippi.
13. Pearl River between Edinburg and Jackson, Mississippi.
14. Dredge for harbors on coast of Mississippi.
15. Removing sunken vessels or craft obstructing or endangering navigation.
16. Operation of dredges.

United States Engineer Office,
Mobile, Ala., July 15, 1910.

Sir: I have the honor to forward herewith annual report for the fiscal year ending June 30, 1910, for the works of rivers and harbors under my charge.

Very respectfully, your obedient servant,

H. Jervey,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

R 1.

IMPROVEMENT OF HARBOR AT MOBILE, ALABAMA.

During the past fiscal year funds have been applied to the following operations:

1. THE DREDGING AND MAINTENANCE OF A 23-FOOT CHANNEL IN MOBILE HARBOR.

Work under the contract with Bowers Southern Dredging Company, dated February 1, 1909, was completed on July 12, 1909, by the removal of 271,277.3 cubic yards of material, place measurement, between July 1 and 12, 1909. The channel dredged over was from beacon 8 to 150 feet south of beacon 6, a distance of 8,014 feet. On days when weather conditions rendered it impracticable for the U. S. dredge *Charleston* to operate on Mobile bar she worked on the lower end of the Mobile ship channel, removing 78,944 cubic yards of material, bin measurement, at a cost of $3,252.65, or 4.12 cents per cubic yard.

The total amount expended on this part of the work was $112,510.72 for the fiscal year, of which $100,320.17 was in payments under the above-mentioned contract with Bowers Southern Dredging Company, and the balance in preservation and maintenance of public property, engineering contingencies, and part of office expenses.

The river and harbor act of June 25, 1910, appropriated $455,000 for work in Mobile Harbor, of which $450,000 has been allotted to the work of dredging a 27-foot channel.

2. THE REMOVAL OF SUNKEN LOGS AND SIMILAR OBSTRUCTIONS.

During the fiscal year the snag boat *Demopolis* was engaged on this work from July 1 to September 28, and the snag boat *Tombigbee* from February 7 to March 24. The following was accomplished by both boats:

Snags removed from river	445
Logs removed from river	133
Stumps removed from river	16

The total distance worked over was 7.7 miles, clearing the river from Chickasaw Creek to its mouth.

The total amount expended on this work was $6,821.37.

Of the amount appropriated by the act of June 25, 1910, $5,000 has been allotted to this part of the work.

GENERAL IMPROVEMENT.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $500,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

REMOVING OBSTRUCTIONS.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on pp. 234 and 235 of H. Doc. No. 421, 57th Cong., 2d sess., except $50,000 allotted to Mobile bar, Alabama, and included in list of appropriations for that work)	$4, 498, 630. 60
March 3, 1903	200, 000. 00
March 3, 1905	200, 000. 00
March 2, 1907	200, 000. 00
May 27, 1908	160, 000. 00
March 3, 1909	110, 000. 00
March 4, 1909	200, 000. 00
April 28, 1904 (maintenance allotment)	50, 000. 00
June 25, 1910	455, 000. 00
June 30. 1910, receipts from sales	1, 582. 67
Total	6, 075, 213. 27

CONTRACT IN FORCE.

With Bowers Southern Dredging Company, dated February 1, 1909, for dredging in harbor at Mobile, Ala.; approximately $160,000 to be applied to the work, at the rate of 9.95 cents per cubic yard, place measurement. Approved by the Chief of Engineers February 18, 1909. Work was commenced February 25, 1909, and was completed July 12, 1909.

COMMERCIAL STATISTICS.

[Statistics furnished by the United States custom-house, Mobile, Ala., showing the business of the port for the calendar year ending December 31, 1909.]

Exports	$27, 805, 687. 00
Imports (valuation at point of shipment)	2, 881, 489. 00
Total	30, 687, 176. 00
Customs receipts from all sources	82, 094. 26

Bunker coal furnished outward bound steamships and tugs, 230,871 tons, valued at $692,613.

The following lines of steamships operate between Mobile and foreign ports: United Fruit Company, Central American ports; Orr-Laubenheimer Steamship Company, Central American ports; Camors-McConnell Steamship Company, Central American ports; Hubbard-Zemurray Steamship Company, Central American ports; Atlantic and Mexican Gulf Steamship Company, Mexican ports; Munson Line, Cuban ports; Markley-Miller Steamship Company, Mexican ports; Elder-Dempster Company, United Kingdom and Continent. The following lines of steamships operate between Mobile and coastwise ports: Mallory Line, Brunswick, Ga., Tampa, Fla., and New York; Pensacola, St. Andrews and Gulf Steamship Company, Florida ports; Mobile and Gulf Steamship Company, Florida ports.

The following statement shows the commerce of Mobile, foreign and domestic, for the calendar year of 1909. Season of navigation, all the year round.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	2	943	945	1,128,495	78,035
Sailing	75	254	329	168,031	3
Total	77	1,197	1,274	1,296,526	78,038

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Anthracite coal	2,652 tons	2,652	$15,914
Asphaltum	9,647 tons	9,647	51,065
Bananas	4,104,817 bunches	123,145	1,324,987
Coal	4,517 tons	4,517	13,841
Cotton and cotton products	82,392 tons	82,392	17,520,992
Coconuts	2,715,241	2,036	44,327
Cement	14,480 sacks	1,448	29,000
Cross ties	100,000	9,400	45,000
Fish and oysters	70,280 barrels	7,028	523,577
Gravel	9,000 tons	9,000	27,000
Hog products	25,616,000 pounds	12,808	2,493,317
Hay and grain	34,872,000 pounds	17,436	761,041
Iron pyrites	26,316 tons	26,316	84,106
Lumber and timber	333,034,500 feet b. m	666,069	6,144,805
Live stock	1,942 head	589	94,279
Manufactured goods	8,636 tons	8,636	857,855
Naval stores	18,396 tons	18,396	383,685
Pineapples	515,960 cubic feet	709	209,156
Sisal grass	8,494 tons	8,494	878,867
Breadstuffs	62,465 tons	62,465	2,501,034
Hard woods	6,144 tons	6,144	154,167
Miscellaneous	335,906 tons	335,906	14,548,925
Total		1,415,233	48,706,940

Average haul and rate per ton-mile could not be obtained.

In addition to the above, water shipments to and from Alabama, Tombigbee, and Mobile rivers, consisting of cotton, cotton goods, logs, cotton seed, provisions, feed, machinery, farm supplies, and manufactured goods, amounted in 1909 to about 495,638 tons, valued at about $8,890,040. Part of this is shown in detail in report on operating and care of locks.

Comparative statement of the number and draft of vessels passing up and down the dredged channel for the calendar years ending December 31, 1908, and 1909.

[Compiled from the books of the harbor master at Mobile, Ala.]

Draft.	Steamships.				Square-rigged vessels.			
	Up.		Down.		Up.		Down.	
	1908.	1909.	1908.	1909.	1908.	1909.	1908.	1909.
Less than 13 feet	429	396	314	284	45	52	10	5
13 to 14 feet	124	121	93	65	5	7		1
14 to 15 feet	57	37	40	33	5	4	4	5
15 to 16 feet	63	55	63	22	1		4	1
16 to 17 feet	18	51	35	68			7	5
17 to 18 feet	11	14	31	31	1		2	7
18 to 19 feet	7	14	30	42		2	4	9
19 to 20 feet	10	5	33	39			6	11
20 to 21 feet	1	3	43	45			11	10
21 to 22 feet	1		29	31			5	8
22 to 23 feet	1		11	36			4	3
Total	722	696	722	696	57	65	57	65

Comparative statement of the number and draft of vessels passing up and down the dredged channel, etc.—Continued.

Draft.	Schooners.				Total.			
	Up.		Down.		Up.		Down.	
	1908.	1909.	1908.	1909.	1908.	1909.	1908.	1909.
Less than 13 feet	153	140	54	51	627	588	378	340
13 to 14 feet		2	19	26	129	130	112	92
14 to 15 feet		8	26	31	62	49	70	69
15 to 16 feet	3	5	19	16	67	60	86	39
16 to 17 feet		1	24	17	18	52	66	90
17 to 18 feet		1	6	5	12	15	39	43
18 to 19 feet		2	6	5	7	18	40	56
19 to 20 feet			2	4	12	5	41	54
20 to 21 feet	2	1	2	3	1	4	56	58
21 to 22 feet				2	1		34	41
22 to 23 feet					1		15	39
Total	158	160	158	160	937	921	937	921

R 2.

IMPROVEMENT OF MOBILE BAR, ALABAMA.

The dredge *Charleston* was engaged here for the entire month of July, 1909, and from January 25 to April 20, 1910, removing shoals which had formed in the dredged channel and increasing the depth in spots where the projected depth of 30 feet at mean low water had not yet been secured. The project has been almost finished. It is probable that the funds at present available will be applied to work of maintenance, as there is not enough money available to permit of much if any original work. During the past fiscal year the *Charleston* removed 121,640 cubic yards of material from this channel, and the year's expenditures amounted to $16,561.06, including part cost of the repairs to the dredge.

During such times as the dredge could not work on the outer bar while engaged at this point, due to heavy weather, she worked in the lower end of Mobile Harbor ship channel.

For commercial statistics, see report on Mobile Harbor, Alabama.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on p. 235 of H. Doc. No. 421, 57th Cong., 2d sess.)	$50,000.00
March 3, 1905	50,000.00
March 2, 1907	50,000.00
March 3, 1909	23,000.00
June 25, 1910	9,000.00
June 30, 1910, receipts from sales	4.55
Total	182,004.55

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[a] Exclusive of the balance unexpended July 1, 1910.

R 3.

IMPROVEMENT OF BLACK WARRIOR, WARRIOR, AND TOMBIGBEE RIVERS, ALABAMA AND MISSISSIPPI.

PROJECT FOR BLACK WARRIOR, WARRIOR, AND TOMBIGBEE RIVERS, ALABAMA.

(A) BLACK WARRIOR RIVER (ABOVE TUSCALOOSA, ALA.).

PRESENT CONDITION OF WORK.

Six locks (10, 11, 12, 13, 14, and 15) completed and opened for traffic; one lock (16) begun under contract and 30 per cent completed; site purchased and plans and specifications forwarded for one lock (17); two locks not yet begun. Survey for these two locks (18 and 19) completed and plans for them prepared.

WORK OF THE PAST YEAR.

Steel gates have been delivered at Locks 14 and 15 and erected by hired labor. Valves and special irons for Lock 16 have been delivered to contractor. Two work barges have been hauled out on ways and thoroughly repaired.

During the year the contractors have accomplished the following contract work at Locks 14, 15, and 16:

Kinds of work and materials.	Units.	Quantity.		
		Lock 14.	Lock 15.	Lock 16.
Grubbing and clearing	Acres	1	2	8
Common excavation	Cubic yards	64,179	30,662	3,659
Rock excavation	do	1,740	1,068	12,400
Stone filling	do	1,280	8,814	2,033
Concrete	do	12,557	19,483	10,188
Riprap, hand placed	do	2,018	2,056	
Miter sills	Feet b. m		3,555	1,350
Framed timber, square edged and sound	do	2,400	91,250	
Framed timber, heart	do	30,801	93,818	
Cofferdam timber	do	246,365	217,768	(a)
Sheathing	do	4,002		
Sheathing taken out and used again	do	1,966		
Placing valves and special irons	Pounds	2,695	48,657	7,436
Lock-tender's house				Complete.

[a] 38 per cent complete.

In addition to above the contractor for Lock 16 has completed his railroad to lock site, built additional camp and storehouses, installed a complete plant and delivered a large amount of timber, lumber, cement, and miscellaneous supplies.

NAVIGATION AND COMMERCE.

The bulk of the traffic on this part of the river passes through the six locks, and is given in detail in the report on operating and care of locks and dams, Black Warrior and Tombigbee rivers, Alabama. In addition to this there was 7,600 tons of coal handled on pool between Locks 12 and 13, and considerable traffic in coal, cement, timber, and contractors' supplies on the pool between Locks 14 and 15.

(B) WARRIOR RIVER (BELOW TUSCALOOSA, ALA.).

PRESENT CONDITION OF WORK.

Six locks (4, 5, 6, 7, 8, and 9) completed. The following items are not yet completed: Dredging in upper end of each pool to obtain full channel depth; removal of snags and obstructions from channel; building fishways at Locks 7, 8, and 9; and building additional lock houses. The minimum depth of channel on this part of river at mean low water is 4½ feet and the minimum width is 50 feet.

WORK OF THE PAST YEAR.

All work on this part of the river is reported under operating and care of locks on the Black Warrior and Tombigbee rivers, Alabama.

NAVIGATION AND COMMERCE.

Most of the traffic on this portion of the stream passed Locks 4, 5, 6, 7, 8, and 9, and is given in detail in the report of operating and care of locks on Black Warrior and Tombigbee rivers, Alabama.

In addition to this 2,800 tons of logs were handled on pool between Locks 7 and 8 and 10,000 tons of logs on pool between Locks 4 and 5.

Data in regard to locks and dams on the Black Warrior and Tombigbee rivers, Alabama.

No.	Miles from Mobile by river.	Name of shoal or nearest landing.	Elevation referred to Mobile datum.							Guard of lock.	Gauge reading at which dam becomes navigable.			
			Miter sill.		Crest of dam.	Zero of—		At mean low water.			On rising river.		On falling river.	
			Lower.	Upper.		Lower gauge.	Upper gauge.	Lower pool.	Upper pool.		Lower gauge.	Upper gauge.	Lower gauge.	Upper gauge.
										Feet.				
1	111.0	McGrew	—6.0	+3.0	11.0	0.0	0.0	2.21	12.0	11.0	21.0	22.0	19.1	20.0
2	182.0	Cherokee Landing	4.5	13.0	21.0	4.5	....	13.6	....	13.0	....	....	....	....
3	205.0	Griffins	14.5	23.0	31.0	14.5	....	20.5	....	13.0	....	....	....	....
4	230.6	Boltons Ferry bar	24.5	33.0	41.0	24.5	24.5	27.7	41.7	13.0	28.5	29.0	27.5	28.0
5	246.2	Dunlap Landing	34.5	43.0	51.0	34.5	34.5	41.9	51.5	13.0	27.5	28.0	23.0	23.8
6	266.7	Bar below Erie	44.5	53.0	61.0	44.5	44.5	51.85	61.5	13.0	27.5	28.0	23.0	23.3
7	282.3	Pickens bar	54.5	63.0	71.0	54.5	54.5	61.75	71.4	13.0	27.5	28.0	23.0	23.3
8	298.3	Log shoal	64.5	73.0	81.0	64.5	64.5	71.65	81.4	13.0	27.5	28.0	23.0	23.3
9	315.2	Mikes bar	74.5	83.0	91.0	74.5	74.5	81.65	91.4	13.0	27.5	28.0	23.0	23.3
10	361.9	Tuscaloosa	84.36	91.86	100.86	84.36	84.36	91.86	101.06	12.96	26.5	27.0	23.0	23.2
11	362.2	.....do	94.36	101.86	109.36	94.36	94.36	101.10	109.5	15.5	29.0	29.5	23.0	23.8
12	363.0	University Falls	102.86	110.86	119.86	102.86	102.86	109.56	119.96	15.0	27.8	28.3	25.0	25.4
13	370.1	Ward shoals	113.36	124.0	132.0	113.36	113.36	120.06	132.10	12.0	29.0	29.5	28.5	29.0
14	373.5	Arnolds shoals	125.5	138.0	146.0	125.5	125.5	132.20	*146.10	12.0	*32.5	*32.0	*30.5	*30.0
15	380.2	Rose shoals	139.5	152.0	160.0	139.5	139.5	*146.20	*160.10	12.0	*32.5	*32.0	*30.5	*30.0
16	386.5	Squaw shoals	153.5	173.0	181.0	153.5	153.5	....	....	12.0	....	....	....	....
17	388.0	.....do	174.5	194.0	202.0	174.5	174.5	....	....	12.0	....	....	....	....
18	398.0	Black Rock shoals	195.5	208.0	216.0	195.5	195.5	....	....	12.0	....	....	....	....
19	407.6	Fork shoals	209.5	222.0	230.0	209.5	209.5	....	....	12.0	....	....	....	....

Quantities marked thus (*) are assumed.

River has not reached low water nor drowned out dams since completion of Locks 14 and 15.

No.	Miles from Mobile by river.	Name of shoal or nearest landing.	Number of valves.		Dimensions of each valve opening.		Time required to—		Dimensions of lock chamber			Condition of the work June 30, 1910.
			Filling.	Emptying.	Filling.	Emptying.	Fill chamber.	Empty chamber.	Width.	Length.		
										Between quoins.	Available for boats.	
							Minutes.	*Minutes.*	*Feet.*	*Feet.*	*Feet.*	
1	111.0	McGrew	4	4	2′ 6¼″ x 5′	2′ 6¼″ x 6′	11	9	52	322	285	Completed; in good condition.
2	182.0	Cherokee landing	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′			52	322	285	Under contract; 28 per cent completed.
3	205.0	Griffins	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′			52	322	285	Under contract; 21 per cent completed.
4	230.6	Boltons Ferry bar	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′	4	4	52	322	285	Completed; in good condition.
5	246.2	Dunlap landing	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′	4	4	52	322	285	Do.
6	266.7	Bar below Erie	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′	4	4	52	322	285	Do.
7	282.3	Pickens bar	4	4	2′ 8¼″ x 6′	2′ 8¼″ x 6′	7	7	52	322	285	Do.
8	298.3	Log shoal	4	4	2′ 8¼″ x 6′	2′ 8¼″ x 6′	7	7	51.65	322	285	Do.
9	315.2	Mikes bar	4	4	2′ 8¼″ x 6′	2′ 8¼″ x 6′	7	7	52	322	285	Do.
10	361.9	Tuscaloosa	4	4	2′ 2¼″ x 5′ 7″	2′ 2¼″ x 5′ 7″	10	10	52	322	285	Do.
11	362.2	.....do	4	4	2′ 2¼″ x 5′ 7″	2′ 2¼″ x 5′ 7″	10	10	52	322	285	Do.
12	363.0	University Falls	4	4	2′ 2¼″ x 5′ 7″	2′ 2¼″ x 5′ 7″	10	10	52	322	285	Do.
13	370.1	Ward shoals	4	4	2′ 6¼″ x 6′	2′ 6¼″ x 6′	8	8	52	322	285	Do.
14	373.5	Arnolds shoals	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′	6	6	52	322	285	Do.
15	380.2	Rose shoals	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′	6	6	52	322	285	Do.
16	386.5	Squaw shoals	6	6	2′ 4⅜″ x 6′	2′ 4⅜″ x 6′			52	332.2	285	Under contract; 25 per cent completed.
17	388.0	.....do	6	6	2′ 4⅜″ x 6′	2′ 4⅜″ x 6′			52	332.2	285	Plans and specifications submitted for approval.
18	398.0	Black Rock shoals	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′			52	325	285	Survey and preliminary estimate completed.
19	407.6	Fork shoals	6	6	2′ 6¼″ x 6′	2′ 6¼″ x 6′			52	325	285	Do.

WORK OF THE PAST YEAR.

(c) TOMBIGBEE RIVER.

At Lock 1 the work was completed, steel stairways being installed at ends of lock walls, gauges placed, flood deposit removed from lock chamber and approaches, approaches completed requiring 747 cubic yards of rip rap and 150 cubic yards of excavation, site graded and 350 cubic yards of gravel filling used to prevent scour, plant and materials stored, all minor repairs and fittings completed, and an examination made to ascertain condition of dam and apron which was found to be satisfactory (after the expiration of one year), all work being completed September 30, 1909, without interruption to traffic.

At Locks 2 and 3 work of construction, under contract with P. H. O'Brien, dated December 4, 1907, was continued. Work at both sites was begun by contractor January 20, 1908. Operations have consisted principally of clearing and grubbing sites, building cofferdams, excavation, delivery of materials, and placing concrete.

The following work was accomplished by the contractor during the fiscal year:

Items.	Units.	Lock 2.	Lock 3.
Grubbing and clearing	Acres	....	0.2
Common excavation	Cubic yards	8,103.6	13,313.0
Foundation excavation	do	2,235.6	3,235.6
Stone filling, placed	do	142.4	240.9
Concrete, placed	do	3,152.3	3,932.6
Riprap, hand placed	do	34.2	50.0
Cofferdam timber, placed	Feet, b. m	81,750.0	47,408.0
Drain pipe, placed	Linear feet	5.0	....
Placing valves and special irons	Pounds	....	364.5
Stone delivered and stored	Cubic yards	1,211.3	2,233.0
Cement delivered and stored	Barrels	4,860.0	17,482.0

Total amount earned under contract to June 30, 1910, $190,151.27, contract being 26 per cent completed.

With hired labor reinforced concrete fence posts were made for the reservations at Locks 2 and 3 out of the materials on hand at the completion of Lock 1.

Cost of Lock and Dam No. 1. to June 30, 1910	$560,290.02
Cost of Lock and Dam No. 2. to June 30, 1910	138,240.62
Cost of Lock and Dam No. 3, to June 30, 1910	116,107.83

TELEPHONES.

Telephone line from Jackson, Ala., connecting Locks 1, 2, and 3, has been maintained.

NAVIGATION AND COMMERCE.

Record of commerce passing through Lock 1 is given under commercial statistics in report of operating and care of locks and dams on the Warrior and Tombigbee rivers, Alabama.

LOCK HOUSES.

Under emergency contract with Levi Frisbie, of Jackson, Ala., dated April 6, 1909, one lock-tender's house at Lock 2 was completed July 19, 1909.

Under emergency contract with Levi Frisbie, dated November 1, 1909, one lock-tender's house at Lock 3 was begun December 13, 1909, and completed March 22, 1910.

PRESENT CONDITION OF WORK.

Lock 1, completed; Lock 2, about 28 per cent completed; and Lock 3, about 23 per cent completed.

Two lock-tender's houses at each lock.

GENERAL.

The entire amount expended on work of lock and dam construction during the fiscal year was $655,615.25.

This slackwater system of improvement is considered entirely worthy of continuation by the General Government.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $600,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

BLACK WARRIOR, WARRIOR, AND TOMBIGBEE RIVERS, ALABAMA.

Total of appropriations to December 31, 1902 (as shown on pp. 233 and 234 of H. Doc. No. 421, 57th Cong., 2d sess.)	[b] $2,439,329.54
March 3, 1903	200,000.00
April 28, 1904	225,000.00
March 3, 1905	100,000.00
March 3, 1905	15,000.00
June 30, 1906	603,466.00
March 2, 1907	350,000.00
March 4, 1907	238,000.00
May 27, 1908	530,000.00
March 4, 1909	1,000,000.00
June 25, 1910	500,000.00
June 25, 1910	312,000.00
	6,512,795.54
June 30, 1910, receipts from sales, etc	2,852.31
Total	6,515,647.85

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] The only money for the Tombigbee River included in this amount is that applied to lock and dam construction, being $50,000 each of appropriations of July 13, 1892, August 18, 1894, June 5, 1896, and March 3, 1899, in all $200,000.

CONTRACTS IN FORCE.

With P. H. O'Brien, dated December 4, 1907, for building Locks and Dams Nos. 2 and 3, Tombigbee River, Alabama, and lock tender's house at the latter lock, at the following unit prices:

19 acres grubbing and clearing, at $200 per acre.
209,400 cubic yards common excavation, at 40 cents per cubic yard.
8,400 cubic yards foundation excavation, at $1.40 per cubic yard.
16,000 cubic yards foundation excavation, at $1.25 per cubic yard.
12,600 cubic yards stone filling, at $5 per cubic yard.
19,200 cubic yards stone filling, at $4.50 per cubic yard.
35,900 cubic yards concrete, at $8.45 per cubic yard.
2,000 cubic yards gravel filling, at $2 per cubic yard.
5,400 cubic yards riprap, hand placed, at $5.50 per cubic yard.
2,900 cubic yards riprap, hand placed, at $5 per cubic yard.
7,200 feet b. m. miter sills, at $100 per 1,000 feet b. m.
859,000 feet b. m. framed timber, square edged, sound, at $45 per 1,000 feet b. m.
950,000 feet b. m. framed timber, heart, at $47.50 per 1,000 feet b. m.
629,500 feet b. m. cofferdam timber, at $37.50 per 1,000 feet b. m.
80,000 feet b. m. sheathing, at $35 per 1,000 feet b. m.
800 linear feet drain pipe, at $1.50 per linear foot.
188,000 pounds placing valves and special irons, at 4 cents per pound.
Lock tender's house, complete, $2,500.

Approved by the Chief of Engineers January 8, 1908.

Work commenced January 19, 1908; to be completed within 500 good working days after notification of approval of contract by the Chief of Engineers.

With the Dravo Contracting Company, dated December 23, 1907, for building Locks and Dams Nos. 14 and 15, Black Warrior River, Alabama, and a lock tender's house at each of these locks, at the following unit prices:

6 acres grubbing and clearing, at $100 per acre.
102,300 cubic yards common excavation, at 70 cents per cubic yard.
3,300 cubic yards rock excavation, at $3.50 per cubic yard.
2,600 cubic yards rock excavation, at $3.75 per cubic yard.
7,580 cubic yards stone filling, at $2.50 per cubic yard.
29,850 cubic yards concrete, at $7.50 per cubic yard.
32,180 cubic yards concrete, at $8.25 per cubic yard.
3,940 cubic yards riprap, hand placed, at $3 per cubic yard.
7,200 feet b. m. miter sills, at $100 per 1,000 feet b. m.
194,700 feet b. m. framed timber, square edged, sound, at $65 per 1,000 feet b. m.
180,800 feet b. m. framed timber, heart, at $70 per 1,000 feet b. m.
471,000 feet b. m. cofferdam timber, at $55 per 1,000 feet b. m.
352,000 feet b. m. cofferdam timber, at $60 per 1,000 feet b. m.
40,000 feet b. m. sheathing, at $50 per 1,000 b. m.
170,000 pounds placing valves and special irons, at 1 cent per pound.
Two lock tenders' houses, complete, at $3,000 each.

Approved by the Chief of Engineers February 1, 1908.

Work commenced February 21, 1908, and was completed on April 25, 1910.

With B. H. Hardaway, dated November 28, 1908, for building Lock and Dam No. 16, Black Warrior River, Alabama, and lock tender's house at this lock, at the following unit prices:

7 acres grubbing and clearing, at $100 per acre.
70,000 cubic yards common excavation, at 50 cents per cubic yard.
35,000 cubic yards rock excavation, at $1.50 per cubic yard.
3,200 cubic yards stone filling, at $2.50 per cubic yard.
38,810 cubic yards concrete, at $7.50 per cubic yard.
6,000 cubic yards riprap, hand placed, at $3 per cubic yard.
4,000 feet b. m. miter sills, at $100 per 1,000 feet b. m.
10,000 feet b. m. framed timber, heart, $75 per 1,000 feet b. m.
100,000 pounds placing valves and special irons, at 4 cents per pound.
Lock tender's house, complete, at $3,000.

Necessary cofferdams, alternative type, including cost of removing, for the lump sum of $13,500.

Approved by the Chief of Engineers December 23, 1908.

Work commenced January 11, 1909; to be completed within 500 good working days after date of notification of approval of contract by the Chief of Engineers.

With Levi Frisbie, dated April 6, 1910 (emergency contract), for building lock tender's house at Lock No. 2, Tombigbee River, Alabama, for the sum of $1,792, in one payment upon completion and acceptance of the house. Work was commenced May 10, 1909, and was completed July 19, 1909.

With Levi Frisbie, dated November 1, 1909 (emergency contract), for building lock tender's house at Lock No. 3, Tombigbee River, Alabama, for the sum of $2,132, in one payment upon completion and acceptance of the house. Work was commenced December 13, 1909, and completed March 22, 1910.

(D) TOMBIGBEE RIVER, MOUTH TO DEMOPOLIS.

The snag boat *Tombigbee* was engaged here from July 21, 1909, to January 10, 1910, working over 185 miles of this section, and March 14–16, 1910, removing a log jam at Lock 1. During this time the following obstructions were removed:

Overhanging trees felled and cut up	1,662
Overhanging trees felled and pulled back	180
Overhanging trees trimmed	5
Logs cut up or stumps leveled on banks	510
Logs removed from drift piles	113
Stumps removed from river	1,618
Snags removed from river	2,223
Logs removed from river	491

The snag boat *Tombigbee* was thoroughly overhauled and her hull calked; two solid bulkheads and a set of hogchains were installed to stiffen the hull, and two rudders were added to improve her steering. This work cost about $1,000.

The total expenditures on this section during the fiscal year were $9,520.86.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $15,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on pp. 233 and 234 of H. Doc. No. 421, 57th Cong., 2d sess.), excluding $50,000 each of the appropriations of June 13, 1892, August 18, 1894, June 3, 1896, and March 3, 1899—in all, $200,000—used in work of lock and dam construction on Tombigbee River, and including $5,332.95 of the appropriation of June 10, 1872, for Tombigbee River, Alabama and Mississippi, shown on page 357 of the same document	$265,542.48
June 13, 1902 (allotment from emergency appropriation, not included in above)	3,776.31
March 3, 1905	15,000.00
March 2, 1907	16,000.00
March 3, 1909	10,000.00
June 25, 1910	13,000.00
Total	323,318.79
June 30, 1910, receipts from sales	210.49
Grand total	323,529.28

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

The commerce of this part of Tombigbee River, during the calendar year of 1909, consisted of about 383,477 tons of cotton, cottonseed, logs, timber, sand, gravel, breadstuffs, fertilizer, farm supplies, provisions, machinery, and general merchandise, valued at $4,530,073. The most of this traffic is shown more in detail in report on operating and care of canals, by the statement of commerce using Lock 1, Tombigbee River.

(E) TOMBIGBEE RIVER, DEMOPOLIS TO COLUMBUS.

Operations here were commenced with the U. S. snag boat *Vienna* July 6, 1909, at Bracketts bar, 27 miles above Epes, Ala., and continued upstream 62 miles farther, when it became necessary to suspend work on account of lack of funds on November 16, 1909. Only that part of the river most needing work was gone over, and the following was accomplished:

Overhanging trees felled and cut up	232
Overhanging trees felled and pulled back	97
Overhanging trees trimmed	16
Logs removed from drift piles	136
Bushes cut, estimated	21,160
Stumps removed from river	276
Snags removed from river	608
Logs removed from river	271
Trees removed from slip-ins	178

The snag boat *Vienna* is worn-out and rotten. It is proposed to have her condemned after removing the irons and parts that can be used on another boat. It is intended to secure a new self-propelling boat for use on this section and the lower part of Tombigbee River above Columbus.

The total amount expended on this locality during the past fiscal year was $3,704.62.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $8,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on p. 357 of H. Doc. No. 421, 5th Cong., 2d sess.)	[b] $223,382.98
March 3, 1905 (allotment)	10,000.00
March 2, 1907 (allotment)	12,000.00
June 25, 1910	11,000.00
Total	256,382.98

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Includes appropriations for Columbus to Vienna, Ala., Demopolis to Columbus, Miss., Demopolis to Vienna, Ala., and Fulton, Miss., to Vienna, Ala., as shown on the page of House Document No. 421 cited.

COMMERCIAL STATISTICS.

Season of navigation.—Open all the year, except when low water prevents.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers—			
Up	127	32,433	644
Down	122		
Small craft—			
Up	136	1,143	....
Down	141		
Barges—			
Up	208	31,537	....
Down	201		
Rafts	86	11,455	....
Total	1,021	76,568	644

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
Cement	15 barrels	3	$25
Coal	5,428 tons	5,428	1,628
Corn	38,398 bushels	1,075	29,566
Cotton	2,040 bales	510	102,000
Cotton-seed meal	1,140 bags	57	1,881
Cotton seed	13,641 bags	1,125	27,000
Cotton-seed hulls	1,120 bags	56	560
Cotton bagging	550 rolls	28	2,200
Cotton ties	2,635 bundles	64	2,635
Flour	1,821 barrels	181	11,254
Fertilizer	101 tons	101	2,222
Hay	22 tons	22	462
Hardware	5 tons	5	2,000
Live stock	33 head	16	3,330
Manufactured steel and iron	90 tons	90	36,000
Molasses	38 barrels	10	570
Miscellaneous	3,528 tons	3,528	529,200
Nails	104 kegs	5	312
Oats	5,405 bushels	86	3,243
Oil	866 barrels	196	4,330
Produce	20,000 pounds	10	400
Stone	10,170 tons	10,170	20,340
Sugar	196 barrels	35	3,130
Logs	7,316,500 feet, b. m.	14,633	73,160
Lumber	146,607 feet, b. m.	294	2,920
Staves	79,216	586	5,925
Total		38,314	866,298

The average haul and rate per ton mile could not be obtained.

(F) TOMBIGBEE RIVER, COLUMBUS TO WALKERS BRIDGE.

Snagging operations, which were commenced with a gasoline launch and a barge on June 17, 1909, were continued downstream for a distance of 115 miles during the fiscal year, until November 5, 1909, at which time funds had become exhausted and work had to be suspended at a point 15 miles below Aberdeen. The following work was accomplished during the fiscal year:

Overhanging trees felled and cut up	1,844
Overhanging trees felled and pulled back	15
Overhanging trees trimmed	3
Bushes cut (estimated)	26,125
Logs or stumps leveled on bank	20
Logs removed from drift piles	374
Stumps removed from river	305
Snags removed from river	3,507
Logs removed from river	534

The expenditures during the year amounted to $2,941.85.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$2,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on pp. 357 and 358 of H. Doc. No. 421, 57th Cong., 2d sess.)	[b]$73,667.05
March 3, 1905 (allotment)	2,000.00
March 2, 1907 (allotment)	2,000.00
March 3, 1909 (allotment)	3,000.00
June 25, 1910	10,000.00
Total	90,667.05

COMMERCIAL STATISTICS.

The commerce on this section of Tombigbee River during the calendar year ending December 31, 1909, consisted of 18,151 tons of logs and general merchandise, valued at $103,679.

R 4.

OPERATING AND CARE OF LOCKS AND DAMS ON BLACK WARRIOR AND TOMBIGBEE RIVERS, ALABAMA.

GENERAL CONDITION OF LOCKS.

LOCKS 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, AND 15.

Lock 1 is in good condition, except that the old guard cribs are in bad condition, some heavy stone should be placed below apron, some light stone above dam, and a storehouse is badly needed. Locks 4, 5,

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Including $4,667.05 of appropriation of June 10, 1872, for Tombigbee River, Mississippi and Alabama, and all of appropriations for above Columbus, Miss., Columbus to Walkers Bridge, Ala., and Fulton to Columbus, Miss., on page 357, and for Walkers Bridge to Fulton, Miss., on page 358 of above-mentioned House document.

6, 7, 8, and 9 are all in good condition, though riprap bank protection should be extended farther downstream below dams; some deposit has collected in all locks and approaches and should be dredged out, and derrick stone should be placed on aprons below Dams 4 and 5, as has been done at the other four locks. Locks 10, 11, 12, and 13 are in good condition, except that gates need repainting very badly, and some of the guide cribs should be rebuilt from the water line up. The material for all this work has been delivered and work will be begun as soon as stage of river permits.

Locks 14 and 15 are in excellent condition.

WORK OF THE PAST YEAR.

Lock 1.—The lock walls were flooded from July 1 to 6, 1909, and February 24 to March 11, 1910, at which periods large quantities of drift had to be removed. Considerable dredging had to be done both at approaches and lock chamber. Concrete posts were made for reservation fences out of material on hand, and materials for new guard cribs were ordered, and 3,422 cubic yards of stone and 51,872 feet b. m., 12 by 12 inch timber delivered.

Lock 4.—Retaining crib below this lock which had been shoved out in channel was removed and replaced by much heavier crib. This work involved building a cofferdam about 180 feet long, excavating about 6,000 cubic yards of earth, placing 96,878 feet b. m. of crib timber, filling 3,025 tons of stone in and around crib, and moving about 3,815 cubic yards of earth in back filling behind crib, and grading bank slopes. Riprap bank protection below the lock was extended by placing 1,628 tons stone and quarry waste. Three thousand and ninety-five tons of stone were filled below dam to check erosion.

Lock 5.—Riprap bank protection at this lock was extended with stone delivered during the previous year.

Lock 6.—Six hundred and twenty-nine tons of derrick stone, which had been delivered in previous year, were placed on apron below dam. One thousand one hundred and seventy-six tons of stone were delivered for extending riprap bank protection. Deposit was dredged from lock approaches.

Lock 7.—Guide cribs which had been undermined and overturned during previous year was replaced with much heavier crib. Twenty-six thousand five hundred feet b. m. timber were used. Six hundred and fifty-six tons stone were filled in and around crib. Two hundred and seventy-five tons of stone and 371 tons of quarry waste were filled along outside of river wall of lock. This lock was pumped out, lock gates cleaned with sand blast and repainted. Deposit dredged from lock approaches.

Lock 8.—Lock was pumped out, gates cleaned and painted. Deposit dredged from lower approach to lock.

Lock 9.—Lock was pumped out, gates cleaned and painted. Deposit dredged from lock approaches. Three hundred and twenty-seven tons of stone were placed on outside of river wall of lock.

Locks 10, 11, and 12.—New miter posts placed on upper gates Lock 10; slight repairs made to gates and valves on other locks. One guide crib rebuilt above the water line, using 11,500 feet b. m. timber and 216 tons stone. All material assembled for rebuilding three other guide cribs above water line and for painting lock gates. Three thousand three hundred and seventy-two tons of quarry waste filled above the three dams.

Lock 13.—One hundred and eighty-eight tons stone used for extending riprap bank protection below dam abutment.

Locks 14 and 15.—These locks have been completed and opened to traffic during the fiscal year. No work has been necessary except the ordinary operating and care.

During the past year the snag boat *R. C. McCalla* worked over the river from Locks 4 to 15, removing 6,547 obstructions from river or from its banks. The 12-inch dredge *Chas. Humphreys* also worked over the river from Tuscaloosa to Demopolis, clearing deposit from lock approaches and cutting channel through bars which had shoaled up. This dredge removed 67,864 cubic yards of material, at a cost of about 12 cents per yard. Six additional pontons and 200 feet of additional pipe line have been fitted up for this dredge. Steamer *Nugent* was taken to Scranton, Miss., where it was hauled out on ways and hull thoroughly repaired. After this boat was brought back to Tuscaloosa the machinery was thoroughly repaired. Repairs to derrick boat and fitting up 8-inch dredge, which were begun during the previous fiscal year, completed. Seven work barges hauled out on ways and repaired. Two quarter boats repaired and painted. Telephone lines between locks have been repaired by replacing about 150 poles, including 4 high poles for river crossings near Locks 4 and 5.

Statement showing allotments and expenditures for operating and care of Locks 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15, Black Warrior and Tombigbee rivers, Alabama, during the fiscal year ending June 30, 1910, as required by Circular 20, Office of the Chief of Engineers, 1909.

Items of approved project.	Amount.
Salaries of regular employees	$22,500.00
Extra labor	2,000.00
Riprap bank protection	7,500.00
Stone filling below dams	12,500.00
Filling above dams	5,000.00
Removing flood deposit from lock and approaches	4,000.00
Dredging in channel between locks	6,000.00
Removing snags and other obstructions from channel between locks	12,000.00
Painting and repairs to gates, valves and ironwork	6,150.00
Painting and repairs to lock houses	650.00
Building fences around reservation at Locks 10 and 12	400.00
Repairing fences at Lock 1	100.00
Tools and plant	2,000.00
Fuel, lights, and oil	1,350.00
Telephone service, repairs and maintenance	1,750.00
Repairs to U. S. steamer Nugent	5,000.00
Repairs to floating plant	4,000.00
Rebuilding guard cribs at Locks 10, 11, and 12	2,400.00
Constructing guard crib, 20 by 40 feet, at Lock 7	2,000.00
Additional property at Lock 10	1,800.00
Constructing boat yard and ways at lock 12	15,000.00
Incidentals	5,000.00
Retaining crib, lower approach to Lock 4	5.000.00
Outstanding liabilities	9,253.83
Purchase of cofferdam timbers for Lock 1	1,500.00
Delivery of stone at Lock 1	1,200.00
Purchase of material for new guard cribs	20,000.00
Total	156,053.83

Balance unexpended July 1, 1909		$17,821.62
Amount allotted during fiscal year ending June 30, 1910:		
First allotment, July 12, 1909	$115,532.21	
Second allotment, March 22, 1910	22,700.00	
		138,232.21
Total amount available during past fiscal year		156,053.83
Amount actually expended during past fiscal year	[a] $126,034.46	
Outstanding liabilities June 30, 1910	15,686.94	
		141,721.40
Balance available for expenditure during the coming fiscal year		14,332.43

COMMERCIAL STATISTICS.

Traffic passing locks on the Black Warrier and Tombigbee rivers, Alabama, during fiscal year ending June 30, 1910.

Items.	Lock 1.	Lock 4.	Lock 5.	Lock 6.	Lock 7.	Lock 8.	Lock 9.
Passenger boats........number..	345	43	18	16	14	16	4
Towboats..................do....	1,937	87	422	60	14	15	16
Barges....................do....	611	507	551	198	192	181	223
Small craft...............do....	117	449	27	19	17	18	23
Rafts.....................do....	1,039	107	48	27	11	16	9
United States boats.......do....	23	55	45	52	69	63	87
Lockages..................do....	2,504	551	517	144	117	121	148
Passengers................do....	7,167	532	441	176	76	124	20
Cement..................tons..	3,172	....	....	....	....	....	....
Coal......................do....	536	3,381	3,489	3,563	3,974	3,940	4,540
Corn......................do....	7,737	1,386	165	190	186	179	....
Cotton....................do....	3,782	422	169	132	123	123	....
Cotton bagging............do....	145	12	12	12	12	12	....
Cotton seed...............do....	2,555	696	111	111	111	111	....
Cotton-seed hulls.........do....	401	100	3	....	....	....	....
Cotton ties...............do....	158	23	23	66	25	25	17
Flour.....................do....	2,128	138	64	64	63	68	....
Fertilizer................do....	4,215	516	291	290	290	282	99
Hay.......................do....	584	40	20	7	....	1	....
Hardware..................do....	805	83	10	5	9	9	2
Live stock................do....	212	3	....	....	....	....	....
Manufactured steel and iron.do....	390	30	30	30	30	50	30
Mixed feed................do....	1,262	76	80	26	20	20	....
Molasses..................do....	236	44	3	2	2	2	....
Oats......................do....	1,618	365	66	53	50	48	....
Oil.......................do....	327	5	3	3	3	3	....
Packing-house products....do....	131	18	2	2	2	2	....
Produce...................do....	35	....	....	....	....	....	....
Sand and gravel..................	....	....	....	....	150	60	330
Stone.....................tons..	1,504	8,053	8,053	9,329	9,997	10,747	11,858
Sugar.....................do....	495	32	5	5	3	4	....
Logs......................do....	270,947	17,024	68,204	8,463	1,995	2,912	1,693
Lumber....................do....	9,884	2,133	70	....	342	226	122
Staves....................do....	13,502	5,802	2,451	1,086	126	....	132
General and miscellaneous..do....	10.433	894	330	231	466	234	72
Freight going up............do....	33,703	6,900	1,177	948	1,118	1,005	693
Freight going down..........do....	303,491	34,376	82,477	22,722	16,841	18,053	18,202
Total freight.........do....	337,194	41,276	83,654	23,670	17,959	19,058	18,895

Items.	Lock 10.	Lock 11.	Lock 12.	Lock 13.	Lock 14.	Lock 15.
Towboats.......................number..	203	210	210	131	4	12
Barges..............................do....	437	469	468	153	21	17
Small craft.........................do....	114	238	259	195	99	59
Rafts...............................do....	1	6	6	6	5	2
United States boats.................do....	107	147	140	24	12	....
Lockages............................do....	396	538	570	353	100	75
Passengers..........................do....	....	....	56	827	113	60
Cement............................tons..	....	....	....	....	....	26
Coal................................do....	4,902	5,173	5,297	397	247	....
Fertilizer..........................do....	123	123	123	....	....	....
Manufactures of steel and iron......do....	38	245	251	258	188	16
Sand and gravel.....................do....	11,808	11,732	11,722	6,939	....	....
Stone...............................do....	11,276	11,370	12,658	....	....	....
Logs................................do....	....	....	....	50	50	50
Lumber..............................do....	375	509	509	266	244	8
General and miscellaneous...........do....	115	101	64	62	16	4
Freight going up....................do....	12,219	12,390	12,387	7,640	437	12
Freight going down..................do....	16,418	16,863	18,237	332	308	92
Total freight.................do....	28.637	29,253	30,624	7,972	745	104

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[a] Not including $3.10 expended for Isthmian Canal Commission to be returned.

Comparative table of commerce through locks on Black Warrior and Tombigbee rivers for fiscal years 1908, 1909, and 1910.

Lock No.	Steamboats.			Barges.			Lockages.			Passengers.			Freight carried (short tons).		
	1908.	1909.	1910.	1908.	1909.	1910.	1908.	1909.	1910.	1908.	1909.	1910.	1908.	1909.	1910.
1	.....	794	2,422	.....	313	611	.....	698	2,504	.....	3,258	7,167	....	117,830	337,194
4	.....	273	185	.....	311	507	.....	188	551	.....	407	532	....	38,289	41,276
5	.....	526	485	.....	589	551	.....	379	517	.....	266	441	....	76,418	83,654
6	.....	230	128	.....	356	198	.....	172	144	.....	223	176	....	42,770	23,670
7	85	178	97	172	317	192	59	133	117	.....	242	76	15,343	36,567	17,959
8	170	153	94	280	295	181	183	123	121	149	257	124	20,666	33,667	19,058
9	116	164	107	225	317	223	133	157	148	.....	308	20	20,584	35,212	18,895
10	155	417	310	235	614	437	252	440	396	.....	305	.....	19,468	47,090	28,637
11	202	535	357	237	649	469	345	684	538	.....	302	.....	19,551	48,535	29,253
12	220	554	350	237	667	468	352	731	570	.....	332	56	19,755	49,581	30,624
13	28	250	155	25	273	153	288	580	353	788	2,299	827	916	12,618	7,972
14	.....	.....	16	.....	.....	21	.....	.....	100	.....	.....	113	....	....	745
15	.....	.....	12	.....	.....	17	.....	.....	75	.....	.....	60	....	....	104

Vessel classification.

[Lock No. 1, Tombigbee River, Ala.]

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	2,111	123,140	7,167
Unregistered:			
Barges	612	59,195	....
Naphtha boats	191	2,334	....
Small craft	119	329	....
Rafts	1,039	265,531	....
Total	4,072	447,529	7,167

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Rate per ton-mile.
Cement	15,860 barrels	3,172.0	$31,720.00	$0.005
Coal	536 tons	536.0	1,608.00	.01
Corn	276,330 bushels	7,737.3	207,247.50	.01
Cotton	15,128 bales	3,782.0	756,400.00	.02
Cotton bagging	2,903 rolls	145.2	8,709.00	.02
Cotton seed	51,101 bags	2,555.1	51,101.00	.02
Cotton-seed hulls	8,021 bags	401.1	4,010.50	.02
Cotton ties	6,333 bundles	158.3	12,666.00	.02
Flour	21,283 barrels	2,128.3	106,415.00	.017
Fertilizer	4,215 tons	4,215.0	84,300.00	.018
Hay	584 tons	584.0	8,760.00	.02
Hardware	805 tons	805.0	80,500.00	.027
Live stock	708 head	212.4	14,160.00	.05
Manufacturing steel and iron	390 tons	390.0	39,000.00	.02
Mixed feed	1,262 tons	1,262.0	31,550.00	.01
Molasses	787 barrels	236.1	19,675.00	.012
Oats	101,117 bushels	1,617.9	50,558.50	.01
Oil	1,633 barrels	326.6	8,165.00	.012
Packing-house products	261,762 pounds	130.9	52,352.40	.012
Produce	69,935 pounds	35.1	34,967.50	.017
Stone	1,504 tons	1,504.0	4,512.00	.007
Sugar	2,831 barrels	495.4	56,620.00	.012
Logs	66,382,910 feet b. m	265,531.5	796,594.92	.006
Lumber	3,673,446 feet b. m	9,086.6	73,468.92	.01
Staves	1,800,305	13,502.3	108,018.30	.02
Logs, oak	1,353,920 feet b. m	5,415.7	20,308.80	.006
Ties, cross	9,476	796.0	3,979.92	.012
General and miscellaneous	10,433 tons	10,433.0	1,043,300.00	.033
Total		337,194.8	3,710,667.26	.016

Average haul of above, 150 miles.

Statement showing cost of quarrying and loading stone on barges, and delivered by towboat to the various works on Black Warrior and Tombigbee rivers, Alabama, during the calendar year, 1909.

	Tons.
Amount of stone, all kinds, quarried and delivered to the various works	17,949.21
Cost of quarrying and loading:	
Labor, quarrying, and loading	$14,836.13
Quarry privilege	445.66
Explosives	1,103.50
Miscellaneous supplies	125.73
Total cost, quarrying and loading 17,949.21 tons at 0.91981+	16,511.02
Cost of towing:	
14,697.03 tons at $0.7536—, or 1,717,728 mile-tons at $0.006448—	11,075.61
Total cost of quarrying, loading, and towing 17,949.21 tons (spalls and quarry waste) at $1.537— per ton	27,586.63

Statement showing number of tons of stone loaded for each lock at Tuscaloosa quarry during calendar year 1909.

Lock.	Spalls.	Quarry waste.	Mile-tons towed.
No. 1, Tombigbee	1,089.87		276,173
No. 4, Tombigbee	2,296.24		304,022
No. 5, Black Warrior	5,098.78	1,501.39	768,260
No. 6, Black Warrior	1,644.77	353.58	192,641
No. 7, Black Warrior	1,239.66	370.82	131,093
No. 9, Black Warrior	326.67	587.01	44,222
No. 10, Black Warrior		858.98	(a)
No. 11, Black Warrior		1,400.68	(a)
No. 12, Black Warrior		992.52	(a)
No. 13, Black Warrior	188.24		1,317
Total	11,884.23	6,064.98	1,717,728

[a] Dropped by hand.

Consolidated statement of cost of towing by steamboat Nugent during calendar year 1909.

Month.	Labor.	Subsistence.	Fuel, oil, etc.	Repairs.	Total.	Miles run.	Mile-tons freight towed.	Cost per mile-ton.
January	$788.87	$152.70	$274.37	$38.30	$1,254.24	956	304,974	$0.0041122
February	737.68	133.64	300.57	34.31	1,206.20	874	343,001	.003516
March	761.79	159.98	235.69	99.99	1,257.45	864	201,887	.006228
April	692.97	123.15	262.60	29.35	1,108.07	1,203	271,169	.0040862
May	689.55	126.84	304.52	24.90	1,145.81	894	224,550	.0051022
June	644.21	142.59	247.00	42.45	1,076.25	1,027	216,102	.0049802
July	702.15	78.65	297.70	45.30	1,123.80	1,382	217,320	.005171+
August	427.59	53.33	35.10		516.02	59		
September	288.75	113.25	41.27	286.64	729.91			
October	310.00	93.34	47.65	62.40	513.39			
November	380.00	84.39	1.40	24.54	490.33			
December	386.00	94.55	162.89	10.70	654.14	362	51,235	1.01276+
Total	6,809.56	1,356.41	2,210.76	698.88	11,075.61	7,621	1,830,238	

7,621 miles run, at $1.4533+ per mile.
1,830,238 mile-tons freight towed, at $0.0060515— per mile-ton.

NOTE.—Steamer *Nugent* laid up for repairs and on account of low water, August 1 to December 15, 1909. Payment to contractor for repairs to hull not included in above, as payment had not been made. All expenses shown are for hired labor work.

OPERATION OF U. S. SNAG BOAT R. C. M'CALLA.

This snag boat operated on the Black Warrior River between Lock No. 15 and Demopolis, Ala., removing snags and obstructions from channel between locks, from July 1, 1909, to January 13, 1910.

Men on duty	16
Overhanging trees felled and cut up	1,705
Overhanging trees felled and pulled back	437
Overhanging trees trimmed	11
Bushes cut (estimated cords)	10
Bushes removed from river (estimated cords)	4
Logs cut up and stumps leveled on bank	819
Trees removed from river	1,524
Stumps removed from river	885
Snags removed from river	520
Logs removed from river	631
Bowlders removed from river	1
Total number of snags and obstructions removed	6,547
Cost of each	$1.07

Note.—Boat went out of commission January 14 to June 30, 1910.

Actual expense report of U. S. snag boat R. C. McCalla, for fiscal year ending June 30, 1910.

Pay roll	$4,918.82
Fuel	289.16
Subsistence supplies	940.36
Engine-room supplies	188.83
Other supplies	9.08
Laundry, ice, and miscellaneous	139.95
Repairs	164.12
Explosives	156.16
Watchman (when out of commission)	200.00
Total	7,006.48
Dynamite, pounds used	1,046
Explosives, number used	345
Number of rations issued	3,115
Average cost of subsistence per month per man	$9.78

OPERATION OF U. S. DREDGE CHAS. HUMPHREYS.

This dredge operated between Lock 10, Black Warrior River, and Lock 4, Tombigbee River, Alabama, dredging in channel between locks, from August 17, 1909, to January 14, 1910, as follows:

Detailed statement.

Location.	Material removed (sand and gravel).
	Cubic yards.
Bar above county bridge	3,095.7
Twenty-one Mile bar	2,632.5
Trussell's bar	11,185.2
Kings Mountain bar	1,414.9
Bald bar	14,913.1
Upper and lower approaches Lock 9	2,600.4
Upper and lower approaches Lock 7	2,424.2
Mussel shoals	2,292.7
Upper Choctaw bar	10,216.7
Upper approach Lock 6	1,394.9
Wolf Bluff bar	2,668.7
Buckmans Island bar	8,049.4
Hatches Draw bar	1,925.9
Lower approach Lock 4	3,050.0
Total	67,864.3

Operating cost: Total, $3,609.51; per cubic yard, $0.0532; total cost, $8,120.50; gross cost per cubic yard, $0.1196.

Note.—All measurements in place.

Distribution of effective working time.

	Hours.
Pumping	833½
Moving cables	8½
Getting in place	68
Total	910

Distribution of time lost while in commission.

	Hours.
Changing location of plant	238
Washing boilers and ordinary repairs	91
Extraordinary repairs	229
Other causes	65
Removing obstructions from pipe line and rock box	152
Sundays and holidays	362
Furnishing steam to run pumps at retaining crib, Lock No. 4	130
Total	1,267
Total time to be accounted for	2,177

NOTE.—Dredge out of commission from January 15 to June 30, 1910.

Money expended.

Pay rolls	$5,554.28
Fuel	965.06
Subsistence supplies	1,121.58
Engine-room supplies	236.59
Other supplies	87.32
Ordinary repairs	184.34
Laundry, ice, miscellaneous expenses, etc	286.45
Total operating cost	8,435.62
Less furnishing steam for pumping out cofferdam around retaining crib at Lock No. 4	315.12
Total cost of dredging	8,120.50

Average number of men employed on board, 17.17.
Rations issued, 2,865.

R 5.

IMPROVEMENT OF PASCAGOULA RIVER, MISSISSIPPI.

The new U. S. dredge *Pascagoula* commenced work on this channel September 21, 1909, and continued operations through the balance of the fiscal year, removing 1,233,653 cubic yards of material and depositing it 1,000 feet from the channel. A large part of this material was stiff clay. About 85 per cent of the work was original dredging, and the channel below the railroad bridge at Scranton, Miss., has been dredged to about 225 feet width, about 100 feet wider than when the *Pascagoula* commenced her work, except at one place about 1 mile long and 125 feet wide. The available draft below the railroad bridge is now 18 feet at mean low tide, while above the bridge the same depth prevails except in a few spots and in that part of the channel which was added by the last river and harbor act and which has not yet been worked over.

The total amount expended on this improvement during the fiscal year was $66,891.62, of which $10,000 was applied to maintenance and the balance to original work. This figure includes all contingent expenses for engineering, inspection, office work, and the like, as well as repair of plant.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on p. 283 of H. Doc. No. 421, 57th Cong., 2d sess.)	[a]$424, 100. 00
Less cost of Horn Island Pass dredging from appropriations of 1894 and 1896	7, 682. 40
	416, 417. 60
March 3, 1903	100, 000. 00
April 28, 1904	25, 000. 00
March 3, 1905	150, 000. 00
March 2, 1907	150, 000. 00
March 3, 1909	75, 000. 00
June 25, 1910	93, 000. 00
Total	1, 009, 417. 60

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers		61	61	135,576	3
Sailing	84	155	239	124,737	
Unregistered, sailing	13		13	7,141	
Total	97	216	313	267,454	3

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Logs	854,000	427,000	$1,700,000
Lumber and timber	245,990,000 feet b. m.	491,980	4,709,160
Cross-ties	150,000 pieces	3,525	45,000
Piling	100,000 pieces	50,000	100,000
Fish and oysters	22,500 barrels	2,250	89,500
Rosin	4,000 barrels	1,060	17,500
Turpentine	1,200 barrels	240	36,000
Charcoal	500,000 barrels	12,000	150,000
Miscellaneous	3,000 tons	3,000	150,000
Total		991,055	6,997,160

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[a] The list of appropriations shown on page 283 of House Document 421, above cited, under the headings " Pascagoula River and Horn Island Harbor " and " Pascagoula River," include all appropriations for Horn Island Pass, Pascagoula River (snagging), and Pascagoula River (dredging).

R 6.

IMPROVEMENT OF PASCAGOULA, LEAF, AND CHICKASAHAY RIVERS, MISSISSIPPI.

On October 9, 1909, the snag boat *Demopolis* was towed up the Pascagoula River to Dead Lake, about 45 miles above its mouth, and snagging operations were commenced here and carried upstream a distance of 17½ miles, when, on December 21, work had to be suspended on account of high water. During this period one of the worst parts of Pascagoula River was cleaned out and put in better condition than it had been before for several years. The working plant used on this stream during recent working seasons has been too light and not suitable until the *Demopolis* was brought here, and she removed many obstructions that formerly had to be left. The following is a statement of the work of this snag boat during the past season:

Stumps removed from river	79
Snags removed from river	323
Logs removed from river	290

Expenditures for fiscal year, $2,539.62.

The *Demopolis* will resume operations here in the near future.

No work was done on either the Leaf or Chickasahay, the expenditure of $200 on the former being in part payment of cost of quarter boat now being used on survey of that stream and later to be used on Leaf River.

FOR PASCAGOULA RIVER.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $4,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

FOR LEAF RIVER.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $8,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

FOR CHICKASAHAY RIVER.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $4,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

FOR PASCAGOULA RIVER, MISSISSIPPI.

Total to December 21, 1902 (included in those for Pascagoula River shown on p. 283 of H. Doc. No. 421, 57th Cong., 2d sess.; see also report immediately preceding this one)	$31,000
June 13, 1902 (allotment)	4,000
March 3, 1905 (allotment)	6,750
March 2, 1907 (allotment)	6,000
June 25, 1910 (allotment)	6,000
Total	53,750

FOR LEAF RIVER, MISSISSIPPI.

Total to December 31, 1902 (as shown on p. 283 of H. Doc. No. 421, 57th Cong., 2d sess.)	$19,750
March 3, 1905 (allotment)	3,250
March 2, 1907 (allotment)	2,500
June 25, 1910 (allotment)	6,000
Total	31,500

FOR CHICKASAHAY RIVER, MISSISSIPPI.

Total to December 31, 1902 (as shown on p. 282 of H. Doc. No. 421, 57th Cong., 2d sess.)	$21,750
March 3, 1905 (allotment)	2,000
March 2, 1907 (allotment)	1,500
June 25, 1910 (allotment)	3,000
Total	28,250

COMMERCIAL STATISTICS.

The following statement concerning the commerce of the Pascagoula River and its tributaries, the Leaf and Chickasahay, for the calendar year ending December 31, 1909, was furnished by the Pascagoula Commercial Club, of Scranton, Miss.:

Articles.	Quantity.	Value.
Pascagoula River:	*Short tons.*	
Logs, lumber, etc	213,837	$987,000
Turpentine	240	36,000
Rosin	800	17,500
Charcoal	12,000	150,000
General merchandise	5,000	250,000
Total	231,877	1,440,500
Leaf River:		
Round logs	180,000	600,000
Hewn timber	8,000	30,000
General merchandise	50	2,500
Total	188,050	632,500
Chickasahay River:		
Round logs and hard wood	75,919	308,000
Sawn and hewn timber	16,000	60,000
General merchandise	50	2,500
Total	91,969	370,500

NOTE.—The tonnage of the Leaf and Chickasahay rivers pass down the Pascagoula River, but in the above statements the business originating on each stream is included alone.

R 7.

IMPROVEMENT OF HORN ISLAND PASS, MISSISSIPPI.

The *Charleston* dredged here from August 1 to October 10, 1909, removing all shoals in the channel and restoring it to its projected depth and width. During this time she removed 158,470 cubic yards of material, and left the channel in good condition. The total amount expended on this improvement during the past fiscal year was $10,231.37.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] 4,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on p. 283 of H. Doc. No. 421, 57th Cong., 2d sess.)	$95,682.40
March 3, 1905	40,480.00
March 2, 1907	9,000.00
March 3, 1909	12,000.00
June 25, 1910	4,500.00
Total	161,662.40

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers		61	61	135,576	3
Sailing	84	155	239	124,737	
Unregistered, sailing	13		13	7,141	
Total	97	216	313	267,454	3

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Lumber and timber	245,990,000 feet b. m.	491,980	$4,709,160
Cross-ties	150,000 pieces	3,525	45,000
Piling	100,000 pieces	50,000	100,000
Total		545,505	4,854,160

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[a] Exclusive of the balance unexpended July 1, 1910.

R 8.

IMPROVEMENT OF HARBOR AT BILOXI, MISSISSIPPI.

No work was done on this harbor during the past fiscal year, and an examination indicates that the channel has shoaled until the mean low-water depth on June 30, 1910, was only a little more than 5 feet, and this depth is about all that is safely available for navigation. No expenditures were made here during the past fiscal year, as there was not sufficient money available to attempt any dredging.

No commercial statistics were obtainable for this harbor, though repeated attempts were made to secure them.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on p. 282 of H. Doc. No. 421, 57th Cong., 2d sess.)	$55,000.00
March 3, 1905	9,000.00
March 2, 1907	9,000.00
June 25, 1910	5,000.00
Total	78,000.00
Less amount turned back into Treasury January, 1896	617.73
Balance	77,382.27

NOTE.—No statistics as to commerce could be obtained.

R 9.

IMPROVEMENT OF HARBOR AT GULFPORT AND SHIP ISLAND PASS, MISSISSIPPI.

During the entire past fiscal year the U. S. dredge *Barnard* was engaged on the Gulfport channel, removing 3,005,270 cubic yards of material, place measurement, therefrom. The amount paid for this work was $111,911, including office expenses, engineering contingencies, and the like. As a result of this work the channel is in good condition, and vessels drawing 21 feet have no trouble in navigating it. No dredging was done in the basin and it has shoaled some at the outer end. These shoals will be removed with funds now available.

The snag boat *Demopolis*, after being repaired, commenced work of removing sunken obstructions from the anchorage basin on March

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[a] Exclusive of the balance unexpended July 1, 1910.

24, 1910, and completed this work on June 8, 1910, accomplishing the following:

Timbers removed	5
Stumps removed	1
Snags removed	208
Logs removed	1
Piles removed	315

Most of these obstructions had been lost in the basin during the process of loading vessels, and it was necessary to have them removed before work of dredging could be safely and efficiently carried on. The amount expended on this work, including part of the cost of repairing the snag boat, was about $3,000.

The U. S. dredge *Charleston* worked on the channel through Ship Island Pass from October 11, 1909, to January 24, 1910, and again from April 21 to June 30, 1910, and during this time removed 398,079 cubic yards of material, bin measurement. The amount expended during the year was $11,227.05, including the cost of part of repairs to *Charleston*, office and other incidental expenses.

Estimated of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $40,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on pp. 283 and 284 of H. Doc. No. 421, 57th Cong., 2d sess.)	$190,000.00
Total amount allotted from indefinite appropriation of July 5, 1884	22,449.76
April 28, 1904	10,000.00
March 2, 1907	75,000.00
March 4, 1907	10,000.00
March 2, 1907 (allotment dated Nov. 9, 1908)	10,000.00
March 3, 1909	170,000.00
June 25, 1910	100,000.00
June 30, 1910, receipts from sales	101.00
Total	587,550.76
Less amount turned back into Treasury in June, 1901	304.12
Balance	587,246.64

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	1	259	260	512,363	27
Sailing	28	139	167	137,397	
Unregistered, sailing	13		13	6,093	
Total	42	398	440	655,853	27

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Lumber and timber	24,559,300 feet b. m.	509,185	$5,204,882
Piling	14,551 pieces	7,279	14,151
Cross ties	26,159 pieces	2,459	17,368
Naval stores	12,979 barrels	3,439	58,175
Cotton	18,427 bales	4,894	1,077,824
Cotton-seed oil	3,050 barrels	534	76,100
Cotton-seed meal	12,720 sacks	636	19,008
Creosote oil	1,263,299 gallons	5,827	57,870
Iron pyrites	8,439 tons	8,439	34,274
Phosphate rock	4,407 tons	4,407	28,645
Miscellaneous	3,165 tons	3,165	34,592
Total		550,264	6,622,889

Average haul and rate per ton-mile not obtainable.

R 10.

IMPROVEMENT OF WOLF AND JORDAN RIVERS, MISSISSIPPI.

No work was done nor expenditures made here during the past fiscal year. An examination indicates that the channel in Jordan River still is available for 7-foot draft, but that in Wolf River has shoaled to about 5½-foot draft at mean low tide.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement .... [a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 2, 1907	$30,000.00
June 25, 1910	5,000.00
Total	35,000.00

COMMERCIAL STATISTICS.

Articles.	Quantity.	Value.
	Tons.	
Lumber	40,840	$284,400
Rosin	6,250	125,000
Turpentine	2,100	262,500
General merchandise	3,598	192,749
Total	52,788	864,649

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[a] Exclusive of the balance unexpended July 1, 1910.

R 11.

IMPROVEMENT OF EAST PEARL RIVER, MISSISSIPPI.

No work was done at this locality during the past fiscal year, no funds being available for the purpose until the passage of the last river and harbor bill.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $6,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on pp. 283 and 284 of H. Doc. No. 421, 57th Cong., 2d sess.)	[b] $28,199.80
June 25, 1910	20,000.00
Total	48,199.80
Less amount turned back into Treasury in June, 1901	345.88
Balance	47,853.92

COMMERCIAL STATISTICS.

It is reported that during the calendar year of 1909 about 13,150 tons of logs and timber used this channel, valued at $126,888. Much more commerce, such as general supplies, fish and oysters, and naval stores passed through the channel, but no definite figures as to amount and value could be obtained.

R 12.

IMPROVEMENT OF PEARL RIVER BELOW ROCKPORT, MISSISSIPPI.

Work was continued on this improvement with the snag boats *Pearl* and *Black Warrior* from the beginning of the fiscal year until in February, 1910, when it was necessary to suspend operations on account of the near exhaustion of funds. During this time 142 miles of the river was worked over and the worst obstructions in the way of logs and snags were removed. Farr's Slough, which formerly opened out of Pearl River and carried off much of the water needed in the channel, was dammed, raising the water level in the river about 1 foot. This dam is 245 feet long by 20 feet wide, with an average height of 6 feet. A dam 117 feet long, 20 feet wide, with an average height of about 15 feet, was built across the outlet known as the head of East Pearl River. The following is a list of obstructions removed by the two snag boats:

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Includes $5,000 each of appropriations of August 11, 1888, and September 19, 1890, for Pearl River below Jackson.

Overhanging trees felled and cut up	1,717
Overhanging trees felled and pulled back	702
Overhanging trees felled and trimmed	29
Bushes cut (estimated)	2,910
Logs cut up or stumps leveled on bank	489
Logs removed from drift piles	159
Stumps removed from river	227
Snags removed from river	1,746
Logs removed from river	477

Some minor repairs were made to the *Black Warrior* and the *Pearl* was thoroughly overhauled and repaired.

The total amount expended during the fiscal year was $20,756.08.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$8,000
For maintenance of improvement	8,000
	[a] $16,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total appropriations to December 31, 1902 (as shown on pp. 283 and 284 of H. Doc. No. 421, 57th Cong., 2d sess.)	[b] $162,125.00
June 13, 1902 (allotment)	1,286.39
March 3, 1905	7,000.00
March 2, 1907	30,000.00
March 3, 1909	15,000.00
June 25, 1910	25,000.00
Total	240,411.39

COMMERCIAL STATISTICS.

During the calendar year 1909 the commerce of this section is reported to have been 27,425 tons of logs and timbers, valued at $166,680, and 629 tons of general merchandise, valued at $118,000.

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Not including $5,000 each from the appropriations of August 11, 1888, and September 19, 1890, diverted to dredging at the mouth of East Pearl River, Mississippi.

R 13.

IMPROVEMENT OF PEARL RIVER BETWEEN EDINBURG AND JACKSON, MISSISSIPPI.

Operations were carried on in this section of the river from July 1 to December 9, 1909, and were suspended on the latter date on account of lack of funds. Work was done by a bank party using a small quarter boat, skiffs, etc., cleaning out the river from 13½ miles below Edinburg up to that place and then turning and working downstream again for a distance of 46 miles, when operations were suspended. The following statement shows what was accomplished:

Overhanging trees felled and cut up	3,820
Overhanging trees felled and pulled back	2,481
Overhanging trees felled and trimmed	86
Bushes cut (estimated)	5,075
Logs cut up or stumps leveled on banks	718
Logs removed from drift piles	63
Stumps removed from river	448
Snags removed from river	2,408
Logs removed from river	549

Amount expended in fiscal year, $2,713.39.

Before any further extensive operations are attempted on this section of Pearl River, and before commencing the construction of a snag boat for use here as has been proposed, it is intended to make a careful examination of the stream and decide whether it is considered as being worthy of further improvement by the General Government. There seems to be such a small amount of traffic, and the efficient working of this long stretch of river will apparently be proportionately so large, that it is thought possible the abandonment of the improvement will be recommended.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (as shown on p. 284 of H. Doc. No. 421, 57th Cong., 2d sess.)	$58,800
March 3, 1905	4,000
March 2, 1907	3,500
March 3, 1909	3,000
June 25, 1910	5,000
Total	74,300

COMMERCIAL STATISTICS.

It is reported that during the calendar year 1909 general merchandise to the extent of 608 tons, valued at $29,972, was transported over this part of Pearl River.

R 14.

DREDGE FOR HARBORS ON COAST OF MISSISSIPPI.

At the beginning of the past fiscal year this dredge, called the *Pascagoula*, had been 80 per cent built, the construction of pontons for the pipe line was 70 per cent finished, and the tug *Tuscaloosa* had been purchased. During the fiscal year the *Pascagoula* was completed, tested, and accepted; pipe for the pipe line was purchased and the line installed; the launch *Biloxi* and a coal barge was built, and the launch *Jordan* and a water barge were purchased. The dredge and attendant plant are now complete and in operation, and the cost of same was $196,833.81.

APPROPRIATIONS.

March 2, 1907 (allotment)	$75,000.00
May 27, 1908	125,000.00
June 30, 1909, receipts from sales	2.10
Total	200,002.10

CONTRACTS IN FORCE.

With the Ellicott Machine Company, dated December 12, 1908, for building a 20-inch hydraulic dredge for harbors on the coast of Mississippi, and delivering same at Scranton, Miss., for the sum of $144,000. Approved by the Chief of Engineers, December 30, 1908.

Supplemental agreement with same company, dated May 11, 1909; approved by the Chief of Engineers June 7, 1909; providing for change in type of ice machine for the dredge and other minor changes in construction, in consideration of which the contract price shall be $400 less than originally provided.

Work commenced January 2, 1909; completed and dredge finally accepted October 30, 1909.

With Thomas M. Favre, dated February 27, 1909, for constructing and delivering at Scranton, Miss., 61 wooden pontons for the lump sum of $9,120.22; approved by the Chief of Engineers March 9, 1909. Work was commenced in March, 1909, and completed July 18, 1909.

R 15.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Under date of February 21, 1910, an allotment of $3,000 was made from the above-named appropriation, to be applied to the removal of sunken barge *Black Diamond* from Mobile River, Alabama.

Proposals were invited by ten-day circular letter for the removal of this barge, and the lowest bid amounting to $750 for doing the work was accepted. Work was commenced on March 14, 1910, and completed April 23, 1910. The unexpended balance of $2,250 was then turned back into the Treasury.

R 16.

OPERATION OF DREDGES.

THE U. S. DREDGE BARNARD.

This dredge operated in Gulfport Harbor, Mississippi, as follows:

Detailed statement.

Improvement.	Material removed.	Operating cost.		Total cost.	Gross cost per cubic yard.
		Total.	Per cubic yard.		
	Cubic yards.		*Cents.*		*Cents.*
Gulfport Harbor, Miss	3,005,270	$91,192.24	3.03	$110,168.63	3.67

NOTE.—All measurements in place.

Distribution of effective working time.

	H.	*m.*
Pumping	2,278	27
Going to and from wharf or anchorage	55	45
Placing dredge	216	48
Waiting for vessels to pass	10	41
Total	2,561	41

Distribution of time lost while in commission.

	H.	*m.*
Changing location of plant	19	30
Bad weather	231	35
Washing boilers and ordinary repairs	725	57
Extraordinary repairs	321	00
Other causes	272	17
Sundays and holidays	1,004	00
Total	2,574	19
Time lost on account of not working at night	3,624	00
Total time to be accounted for	8,760	00

NOTE.—Double crew maintained until September 2.

Money expended.

Pay rolls	$33,931.37
Fuel for boilers	25,464.23
Fuel for galley	132.00
Supplies, subsistence	10,133.49
Supplies, engine room	5,442.70
Other supplies, paints, rope, etc	2,922.39
Renewals or additions to outfit	8,455.50
Ordinary repairs	3,845.21
Laundry, ice, miscellaneous expenses, etc	865.35
Total operating cost	91,192.24
Extraordinary repairs	5,760.11
Office expenses, superintendence, surveys, etc	13,216.28
Total cost of dredging	110,168.63

THE U. S. DREDGE PASCAGOULA.

This dredge operated in Pascagoula River, Mississippi, as follows:

Detailed statement.

Improvement.	Material removed.	Operating cost.		Total cost.	Gross cost per cubic yard.
		Total.	Per cubic yard.		
	Cubic yards.		*Cents.*		*Cents.*
Pascagoula River, Miss	1,233,653	$56,519.88	4.58	$66,002.09	5.35

NOTE.—Measurements in place.

Distribution of effective working time.

	H.	*m.*
Pumping	3,620	48
Handling pipe line	178	45
Handling swinging wires	136	45
To and from wharf	37	00
Placing dredge	8	57
Waiting for vessels to pass	1	40
Total	3,983	55

Distribution of time lost while in commission.

	H.	*m.*
Changing location of plant	143	50
Bad weather	135	04
Washing boilers and ordinary repairs	1,019	18
Extraordinary repairs	328	30
Other causes	101	23
Sundays and holidays	1,080	00
Total	2,808	05
Total time to be accounted for (Sept. 21 to June 30)	6,792	00

Money expended.

Pay roll	$23,553.38
Fuel	11,320.17
Water	255.88
Supplies, subsistence	5,551.60
Supplies, engine room	3,702.46
Other supplies	5,319.22
Renewals or additions to outfit	4,775.64
Ordinary repairs	1,320.70
Laundry, ice, miscellaneous expenses	720.83
Total operating cost	56,519.88
Extraordinary repairs	1,197.24
Office expenses, superintendence, surveys, etc	8,284.97
Total cost of dredging	66,002.09

THE U. S. DREDGE CHARLESTON.

This dredge operated as follows, at Ship Island Pass and Horn Island Pass, Mississippi, and on the outer bar of Mobile Harbor, Alabama. When weather conditions prevented work on Mobile bar she operated in Mobile ship channel:

Detailed statement.

Location.	Character of material.	Amount dredged.		Rate per minute, pumping.	Rate per hour, pumping.	Total time pumping.	
		Loads.	Cubic yards.				
				Cubic yards.	*Cubic yards.*	*H.*	*m.*
Mobile bar	Sand	452	121,640	5.834	350.04	347	30
Mobile ship channel	Mud	437	78,944	18.270	1,096.40	72	00
Horn Island Pass	Sand-mud	623	158,470	9.605	576.30	275	00
Ship Island Pass	do	2,426	398,079	13.928	835.68	476	21
Total		3,938	757,133	10.777	646.62	1,170	51

Location.	Material removed.	Operating cost.		Total cost.	Gross cost per cubic yard.
		Total.	Per cubic yard.		
	Cubic yards.		*Cents.*		*Cents.*
Mobile bar and ship channel	[a] 200,584	$11,289.51	5.63	$16,546.06	8.24
Horn Island Pass	158,470	7,690.00	4.85	10,636.10	6.71
Ship Island Pass	398,079	10,443.47	2.62	12,537.94	3.15
Total	757,133	29,422.98	3.88	39,720.10	5.25

[a] Includes 78,944 cubic yards dredged from Mobile ship channel during rough weather on the bar, at a total cost of $3,252.65.

Distribution of effective working time.

	H.	*m.*
Pumping	1,170	51
Dumping	227	45
Going to and from dump	828	54
Going to and from wharf or anchorage	524	01
Total	2,749	31

Distribution of time lost while in commission.

	H.	*m.*
Taking coal and water	188	30
Bad weather	294	30
Washing boilers and ordinary repairs	274	17
Extraordinary repairs	158	00
Sundays and holidays	708	00
Other causes	121	30
Total	1,744	47
Time lost on account of not working at night	4,265	42
Total time to be accounted for	8,760	00

Money expended.

Pay roll	$16,894.49
Fuel	5,262.04
Water	6.75
Supplies, subsistence	3,779.14
Supplies, engine room	838.65
Other supplies	737.75
Renewals or additions to outfit	1,252.53
Ordinary repairs	407.00
Laundry, ice, miscellaneous	244.63
Total operating cost	29,422.98
Extraordinary repairs	9,111.76
Office expenses, superintendence, surveys, etc	1,185.36
Total cost of dredging	39,720.10

APPENDIX S.

IMPROVEMENT OF RIVERS AND HARBORS IN THE NEW ORLEANS, LOUISIANA, DISTRICT.

REPORT OF LIEUT. COL. LANSING H. BEACH, CORPS OF ENGINEERS, OFFICERS IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Southwest Pass, Mississippi River.
2. Maintenance and improvement of South Pass channel, Mississippi River.
3. Examinations and surveys at South Pass, Mississippi River.
4. Bayou Plaquemine, Grand River and Pigeon bayous, Louisiana.
5. Operating and care of Plaquemine Lock, Plaquemine, Louisiana.
6. Bayou Teche, Louisiana.
7. Inland Waterway, Franklin to Mermentau, and from Mermentau River, Louisiana, to Sabine River, Louisiana and Texas.
8. Mouth and passes of Calcasieu River, Louisiana.
9. Bogue Chitto, Chefuncte River and Bogue Falia, Tickfaw River and tributaries, and Amite River and Bayou Manchac, Louisiana.
10. Channel, bay, and passes of Bayou Vermilion and Mermentau River and tributaries, including Bayou Plaquemine Brule, Louisiana.
11. Homochitto River, Mississippi.
12. Bayou Lafourche, Louisiana.
13. Removing hyacinths from Louisiana waters.
14. Bayou Terrebonne, Louisiana.
15. Atchafalaya River, Louisiana, from Morgan City to the Gulf of Mexico.
16. Lake Pontchartrain and Pass Manchac, Louisiana.
17. Removing sunken vessels or craft obstructing or endangering navigation, indefinite.

UNITED STATES ENGINEER OFFICE,
New Orleans, La., July 16, 1910.

SIR I have to submit herewith annual reports upon works of river and harbor improvement for this district for the fiscal year ending June 30, 1910.

Very respectfully,

LANSING H. BEACH,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

S 1.

IMPROVEMENT OF SOUTHWEST PASS, MISSISSIPPI RIVER.

For history of this work, see current summary, page 489.

Details of operation for the fiscal year 1910 are given in the following extract from the report of Mr. Cornelius Donovan, assistant engineer:

Dredging.—The dredge *Benyaurd* operated in the Southwest Pass channel day and night, mostly beyond the sea ends of the jetties, known as the outer channel, except for about three and one-half months, during which time necessary general repairs were made at the United States naval station, New Orleans, La. This dredge removed 1,794,934 cubic yards of material during the year, at a cost of 5.07 cents per cubic yard exclusive of extraordinary repairs and 5.39 cents per cubic yard including extraordinary repairs.

Exclusive of Sundays and other legal holidays, the dredge *St. Johns* was undergoing repairs 103 days during the year, dredging in South Pass 47 days and in Southwest Pass 156 days. During the year this dredge removed from both passes 604,686 cubic yards of material, at a cost of 10.28 cents per cubic yard exclusive of extraordinary repairs and 11.01 cents per cubic yard including extraordinary repairs.

The dredge *Sumter* arrived at Pensacola Navy-Yard from her home port, Charleston, S. C., June 17, and after undergoing extensive repairs returned to Port Eads, arriving there November 8, 1909. After operating in South Pass 13 days this dredge went to Southwest Pass and operated in that channel the remainder of the fiscal year, removing from both passes 382,838 cubic yards of material, at a cost of 13.12 cents exclusive of extraordinary repairs and 23.47 cents including extraordinary repairs.

DREDGING BY THE BOWERS SOUTHERN DREDGING COMPANY

Under contract dated December 9, 1909, the Bowers Southern Dredging Company dredged in the outer channel, excavating a channel 35 feet deep by 100 feet wide for a distance of about 3,000 feet. The contract was completed March 9. 1910, and 17,946 cubic yards of material removed.

EXTENSION OF THE EAST JETTY.

Under a contract dated September 30, 1909, with Christie and Lowe, the east jetty was extended seaward 2,600 feet. The work was completed May 28, 1910, and consisted of a foundation tier of mattresses, composed of 13 mattresses 200 feet long by 150 feet wide by 3 feet thick, on top of which was placed another tier of mattresses, 13 in number and of the same dimensions as those in the foundation except in width, which was 95 feet. On each mattress in both tiers 83⅓ pounds of stone per square foot was placed. Seventy thousand seven hundred and seventy-seven and seven-ninths square yards of mattress and 26,541⅔ tons of stone were used in this work and cost $197,818.37.

CONSTRUCTION OF BUILDINGS.

On April 10, 1909, a contract was entered into with Peter Eskald for the construction of 16 dwellings and one office building, on pile foundations put in place by the United States, at a cost of $34,940. Work under this contract was begun May 5, 1909, and completed September 16, 1909.

COMBINED PILE DRIVER AND DERRICK.

This plant was constructed by Peter Eskald, of Biloxi, Miss., under contract dated September 29, 1909, at a cost of $9,192.06. The work was completed February 3, 1910. The plant consists of a wooden barge 75½ feet long, 30 feet beam, and 5 feet depth, on which was placed a pile driver with leads 52 feet long, a Warrington steam hammer with striking parts weighing 3,000 pounds, a derrick of 5 tons lifting capacity, two double-drum hoisting engines of 30 horsepower each, and one 40-horsepower boiler.

REMOVING MATTRESS SILL ACROSS THE HEAD OF SOUTHWEST PASS.

Under a contract dated October 4, 1909, the Bowers Southern Dredging Company undertook to remove from the bed of the river and across the head of Southwest Pass portions of a mattress sill which was placed there during the

Eads contract for improving South Pass, the contract price for removal being $40,000.

The time for completion of this contract expired March 26, 1910, and little progress having been made the contractor, under date of March 15, 1910, requested that the date of completion be extended for a reasonable period. This was recommended for approval and was approved by the Chief of Engineers, the contractor to bear such expenses due to said waiver as are properly chargeable under the terms of the contract.

WORK DONE BY PERMANENT FORCE.

Wharf constructed.—A storage wharf 176 feet long, 60 feet wide for a distance of 16 feet and 30 feet wide for a distance of 160 feet, consisting of creosoted piles and lumber, was completed early in November, 1909, at a cost of $4,309.70.

Barges.—Through the courtesy of Maj. Harry Burgess, Corps of Engineers, three barges were built at the depot under his charge at a cost of $2,410.51 each. These were constructed of creosoted lumber, and are used for handling willows and stone.

The jetties.—Between stations 12900 and 13100 the west jetty subsided so that its upper surface was below the low-water line. This portion was raised 2 feet above high water by driving a row of piles on each side of the concrete wall and filling between them with 100 cords of willows weighted with 54 cubic yards of stone.

Three hundred and forty-one cubic yards of stone was added to the revetment around the sea ends of the jetties.

Outlet bayous.—One thousand four hundred and eighty cords of willows, 300 cubic yards of stone, and 30 piles were used to reinforce and maintain the sheet-pile dam across " Dead Mans Bayou."

A total of 409 cords of willows and 168 cubic yards of stone were placed in minor outlets in the vicinity of Southwest Pass light to bring them above high tide.

The machine shop and ice plant were operated, current repairs to dredges and other plant made, and work incident to the care and maintenance and improvement of the Burrwood station attended to.

Spur dikes.—These spur dikes are for the purpose of contracting the waterway and augmenting the scouring power of the current. One of them, 600 feet long, has been completed, and five are in process of construction. Four of them project from the east jetty between stations 8000 and 21000, and one from the east bank just above Middle Grand Bayou.

These dikes consist of two and sometimes three rows of piles connected by waling timbers, braced transversely. The space between the rows of piling is then filled with willows weighted with stone.

The following materials were used in the construction of these dikes: 37,830 lineal feet of creosoted piling, 4,670 lineal feet untreated piling, 5,820 lineal feet waling timber, 2,490 cubic yards stone, and 5,717 cords of willows.

SURVEYS.

The following charts[a] accompany this report:

No. 1. Chart of Southwest Pass, for 11 miles, from its head to Custom-House Bayou.

No. 2. Chart of Southwest Pass, for 9 miles, from Custom-House Bayou to the Gulf of Mexico.

No. 3 Comparative profiles.

Besides the surveys represented on the above-mentioned charts, six others were made of the lower 9 miles of the channel and minor smaller surveys of particular localities which required special attention.

By reference to Charts Nos. 1 and 2, it will be seen that nowhere throughout the 19 miles of channel, from the head of Southwest Pass to the sea ends of the jetties at the mouth of that pass, is the depth of water less than 35 feet. From where the 35-foot depth ends seaward from the ends of the jetties to the 35-foot contour in the Gulf is a distance of 1,800 feet, over which there is a central depth of 30 feet and an available depth of 25 feet. But little remains to be done to remove the barrier which intervenes between the 35-foot depth in the channel and the same depth in the Gulf, but progress in that direction is rendered slow because of the frequent appearance of mud lumps. The formation now beyond the ends of the jetties is not, as many, and particularly the laymen, believe, altogether caused by deposits of material carried in suspension by the water of the river, but is in some degree caused by the forcing up of the bottom by pressure due to underlying gas.

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[a] Omitted, and a chart of part of Southwest Pass showing location of jetties printed instead.

Discharge measurements.—On March 6, 1909, a series of observations were begun, and completed August 30, 1909, to determine the volume and relative percentage of the flow through South Pass, Southwest Pass, and Pass a Loutre, of the water of the Mississippi River below Cubits Crevasse.

The results of these determinations show that at present South Pass carries 11.2 per cent, Southwest Pass 44 per cent, and Pass a Loutre 44.8 per cent of the water below Cubits Crevasse.

These results, compared with similar ones obtained in 1905, show that the flow through South Pass increased 2 per cent, Pass a Loutre one-tenth of 1 per cent, while Southwest Pass decreased 2.1 per cent, and indicate only a change in the distribution of the flow, since it is known that in consequence of sills across Cubits Gap and the Jump the volume of discharge through all of the passes is greater than in 1905.

Subsidence of the jetties.—The subsidence of the jetties as determined by levels taken on the concrete capping is as follows:

East jetty.—Mean subsidence during the year, 0.25 feet; maximum, 1.21 feet at station 16300; minimum, 0.0 feet at stations 8100, 8300, 8800, and 9000.

Mean subsidence since superstructure was completed, 1.6 feet.

West jetty.—Mean subsidence during the year, 0.34 feet; maximum, 1.35 feet at station 12100; minimum, 0.08 feet at station 5200.

Mean subsidence since superstructure was completed, 1.61 feet.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$300,000	
For maintenance of improvement	150,000	
		[a]$450,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.		

APPROPRIATIONS.

June 13, 1902		$750,000.00
March 3, 1903		1,000,000.00
March 3, 1905		1,250,000.00
June 30, 1906		500,000.00
March 2, 1907		1,000,000.00
May 27, 1908		1,170,000.00
March 3, 1909 (allotted from appropriation preservation and maintenance of river and harbor works)		275,000.00
March 4, 1909		330,000.00
June 25, 1910		750,000.00
		7,025,000.00
Miscellaneous receipts deposited to the credit of the appropriation		3,956.67
Transferred by Treasury Department from appropriation for repairs and incidental expenses of light-houses, 1909, on account of coal furnished to the Light-House Department by the Engineer Corps		433.01
Receipts on account of refundments in connection with forgeries		177.65
		7,029,567.33
Transferred to appropriation for maintenance, South Pass Channel, 1906	$23,305.33	
Amount withdrawn and placed to credit of Philadelphia office in connection with construction of new dredge (*New Orleans*)	29,000.00	
		52,305.33
		6,977,262.00

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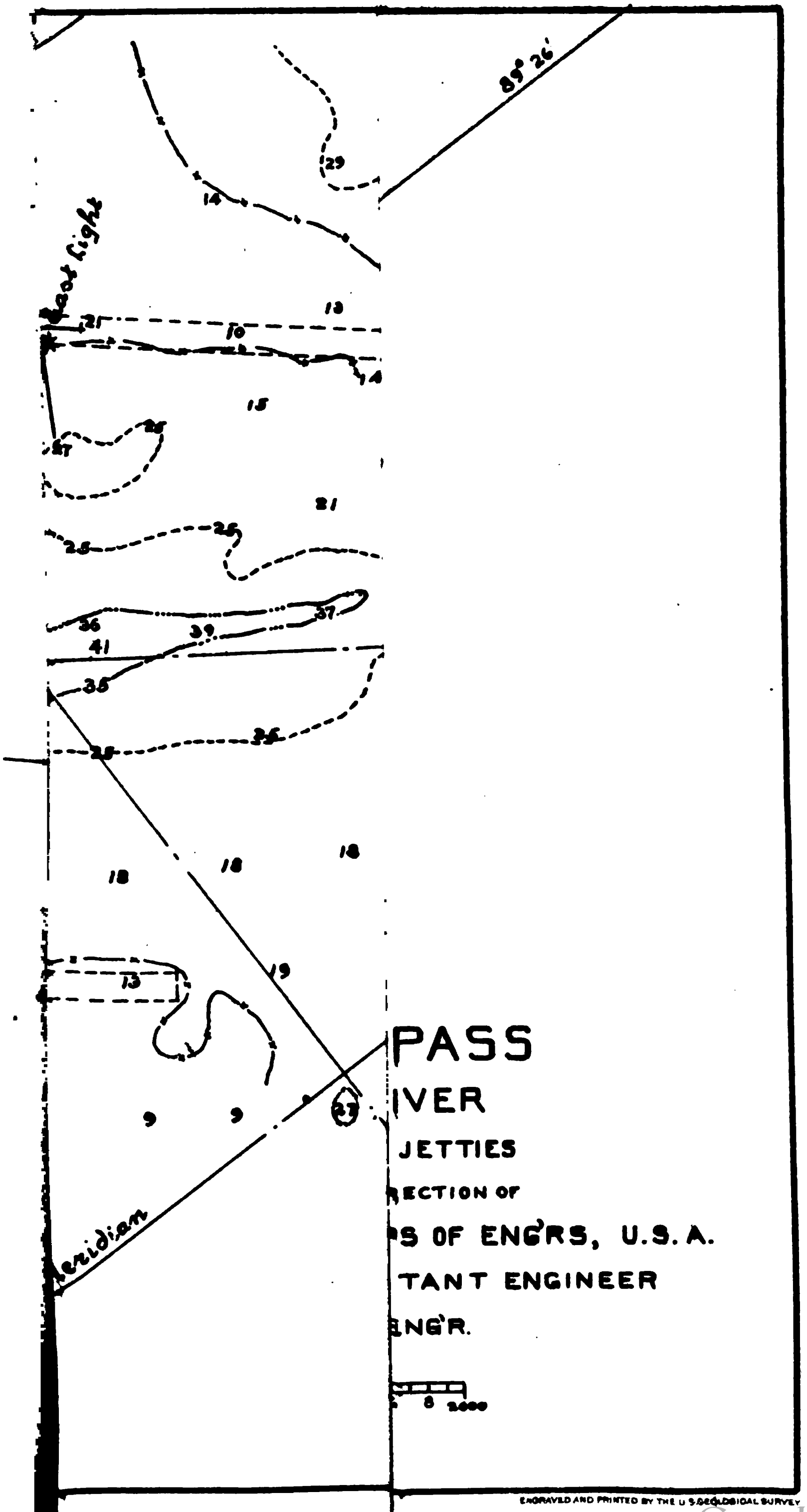
[a] Exclusive of the balance unexpended July 1, 1910.

RS, U.S. ARMY.



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ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

I.

Name and address of contractor: Peter Eskald, Biloxi, Miss.

Work: Constructing 16 houses and 1 office building at Southwest Pass, Mississippi River.

Contract price:	
Houses Nos. 1, 2, 3, 4, shown on sheets 1 and 2, $2,470 each	$9,880
Houses Nos. 1 to 12, shown on sheet No. 3, both inclusive, $1,960 each	23,520
Office building, shown on sheet No. 4, $1,540	1,540
Total	34,940

Date of contract: April 10, 1909.
Date of approval: May 10, 1909.
Date of commencement: June 16, 1909.
Date of completion: November 8, 1909.

II.

Name and address of contractor: Salmen Brick and Lumber Company (Limited), New Orleans, La.

Work: Furnishing creosoted piles and lumber at Southwest Pass, Mississippi River, as follows:

	Each.
23 piles, 50 feet long	$15.62
128 piles, 45 feet long	14.06

Lumber.

	Per M feet.
60 pieces, 12 by 12 inches by 16 feet, 11,520 feet b. m	$39.50
10 pieces, 6 by 12 inches by 20 feet, 1,200 feet b. m	39.50
150 pieces, 4 by 12 inches by 20 feet, 12.000 feet b. m	39.50
550 pieces, 2 by 8 inches by 16 feet, 11,733 feet b. m	39.50

Date of contract: June 11, 1909.
Emergency contract.
Date of commencement: June 16, 1909.
Date of expiration: August 10, 1909.

III.

Name and address of contractor: Richard M. Murphy. New Orleans, La.
Work: Furnishing stone at South and Southwest passes, Mississippi River.
Contract price: $3.45 per cubic yard.
Quantity: 10,000 cubic yards, more or less.
Date of contract: June 28, 1909.
Date of approval: June 30, 1909.
Date of commencement: July 6, 1909.
Date of completion: October 4, 1909. (Waived for a reasonable period.)

IV.

Name and address of contractor: Richard M. Murphy, New Orleans, La.

Work: Furnishing willows required for the works at South and Southwest passes, Mississippi River, from August 3, 1909, to June 30, 1910.

Contract price: $1.50 per cord delivered on barges belonging to the United States. All towing above Fort Jackson to be done by the contractor.

Quantity: 12,000 cords, more or less.
Date of contract: July 20, 1909.
Date of approval: July 29, 1909.
Date of commencement: August 3, 1909.
Date of expiration: June 30, 1910.

V.

Name and address of contactor: Schwarzschild & Sulzberger Company, New Orleans, La.

Work: Furnishing and delivering meat for employees on United States plant from August 29 to December 31, 1909.

Article.		Estimated quantity.	Unit price per 100 pounds.
Beef:			
Fresh western, hind quarters	pounds	30,000	$9.25
Fresh western, fore quarters	do	5,000	5.50
Mutton, whole carcasses	do	1,250	10.00
Veal, whole carcasses	do	1,250	9.20
Pork shoulders, fresh	do	1,000	11.12
Pork loins, fresh	do	1,250	14.37
Sausage:			
Pork-link	do	900	7.68
Bologna	do	400	6.61
Vienna	do	400	8.04
Tripe, pickled (15s)	kits	4	[a] .90
Pig tongues, pickled	quarter barrels	6	[b] 6.15
Spare ribs (100s)	half barrels	4	[c] 8.50
Livers:			
Beef	pounds	100	5.50
Calf	number	6	[d] .37

[a] Per kit. [b] Per quarter barrel. [c] Per half barrel. [d] Each.

A deduction of 5 per cent from above prices for deliveries f. o. b. city limits, New Orleans, La.

Date of contract: July 31, 1909.
Date of approval: August 24, 1909.
Date of commencement: August 29, 1909.
Date of expiration: December 31, 1909.

VI.

Name and address of contractor: W. G. Coyle & Co., New Orleans, La.

Work: Furnishing and delivering coal for United States plant from September 18, 1909, to June 30, 1910.

Price:

- Delivered in government yards at Port Eads or Burrwood, La., 39 cents per barrel.
- Delivered in bunkers of dredges at New Orleans, La., $3.60 per ton of 2,000 pounds.
- Delivered in barge or boat belonging to contractor at Port Eads or Burrwood, La., 35 cents per barrel, to be unloaded by the United States.

Date of contract: August 31, 1909.
Date of approval: September 10, 1909.
Date of commencement: September 18, 1909.
Date of expiration: June 30, 1910.

VII.

Name and address of contractor: Peter Eskald, Biloxi, Miss.

Work: Furnishing and delivering a combined pile driver and derrick plant at Burrwood, La.

Contract price: $9,192.06.
Date of contract: September 29, 1909.
Date of approval: October 18, 1909.
Date of commencement: October 26, 1909.
Date of expiration: February 26, 1910.

VIII.

Name and address of contractor: Christie & Lowe, Chicago, Ill.

Work: Constructing and sinking mattresses with stone at Southwest Pass, Mississippi River, for the extension of the east jetty.

Contract price: 70,778 square yards of brush mattresses, properly placed in the work, $1.30 per square yard; 26,542 square yards of riprap stone in place, $4 per ton of 2,000 pounds.

Date of contract: September 30, 1909.

Date of approval: October 22, 1909.

Date of commencement: October 26, 1909.

Date of completion: March 26, 1910 (waived for a reasonable period).

IX.

Name and address of contractor: Bowers Southern Dredging Company, Galveston, Tex.

Work: Removing a mattress sill laid on the bed of the river across the head of the Southwest Pass, Mississippi River.

Contract price: $40,000.

Date of contract: October 4, 1909.

Date of approval: October 20, 1909.

Date of commencement: October 26, 1909.

Date of expiration: March 26, 1910 (waived for a reasonable period).

X.

Name and address of contractor: Bowers Southern Dredging Company, Galveston, Tex.

Work: Dredging in connection with improving the Southwest Pass of the Mississippi River.

Contract price: For furnishing dredging plant, $500 per calendar day; for removal of material, 10 cents per cubic yard.

Date of contract: December 1, 1909.

Date of approval: December 9, 1909.

Date of commencement: December 30, 1909.

Date of completion: Indeterminate (terminated March 9, 1910).

XI.

Name and address of contractor: Salmen Brick and Lumber Company (Limited), New Orleans, La.

Work: Furnishing an ddelivering waling timbers and piles on the river bank or wharves in Southwest Pass, Mississippi River, as follows:

35 timbers, 10 inches by 12 inches by 24 feet, at $28 per M feet b. m.

65 timbers, 10 inches by 12 inches by 18 feet, at $25 per M feet b. m.

70 hewn timbers, 60 feet long, at 40 cents per linear foot.

100 piles, 50 feet long, at 12 cents per linear foot.

450 creosoted piles, 50 feet long, at 38 cents per linear foot.

110 cresoted piles, 60 feet long, at 38 cents per linear foot.

Date of contract: January 17, 1910.

Date of approval: January 22, 1910.

Date of commencement: January 27, 1910.

Date of completion: March 28, 1910.

XII.

Name and address of contractor: Salmen Brick and Lumber Company (Limited), New Orleans, La.

Work: Furnishing and delivering on the river bank or wharves in Southwest Pass, Mississippi River, 1,142 40-foot creosoted piles.

Price: 36 cents per linear foot.

Date of contract: March 14, 1910.

Date of approval: March 21, 1910.

Date of commencement: March 26, 1910.

Date of completion: June 24, 1910.

XIII.

Name and address of contractor: Bryan Black Lumber Company, New Orleans, La.

Work: Furnishing and delivering on the river bank or wharves in Southwest Pass, Mississippi River. 167 long-leaf yellow pine waling timbers, 60 feet long.

Price: 20 cents per linear foot.

Date of contract: March 14, 1910.

Date of approval: March 21, 1910.

Date of commencement: March 26, 1910.

Date of expiration: June 25, 1910.

S 2.

MAINTENANCE AND IMPROVEMENT OF SOUTH PASS CHANNEL, MISSISSIPPI RIVER.

For history of this work, see current summary, page 492.

Details of the work for the fiscal year 1910 are given in the following extract from the report of Mr. Cornelius Donovan, assistant engineer:

Maintenance of jetties and auxiliary works.—Such necessary work, generally in the nature of repairs, as was required to maintain the jetties and auxiliary works throughout South Pass in an efficient condition was done.

Dredging.—But little dredging was required during the year. The dredge *St. Johns* operated 47 days, and the dredge *Sumter* 13 days. During 30 days of this time dredging was done in the outer channel. No dredging was required in the main body of the pass.

The plant.—Current repairs were made to the floating plant, wharves, and buildings. One new barge, 100 by 22½ feet, was built at a cost of $2,410.51, and one new barge, 55½ by 25 feet, for pile driver, at a cost of $2,007.47.

Materials and labor.—The following materials and labor were required during the year: Nine thousand nine hundred and twenty-two days of eight hours each, 12,791 cords of willows, 5,668 cubic yards of stone, 608 piles, 109 waling timbers, 219,007 feet b. m. lumber, and 11,980 barrels coal.

Navigation of the channel.—One hundred and fifty-two vessels, drawing 25 feet or more, the deepest draft being 28¾ feet, passed through the channel during the year.

At the present time the available depth throughout the pass is 31 feet, and the channel is in excellent condition.

APPROPRIATIONS.

June 6, 1900 (indefinite) $100,000 annually	$1,000,000.00
June 6, 1900 (allotted)	10,000.00
June 13, 1902	75,000.00
June 30, 1906	50,000.00
March 2, 1907	50,000.00
May 27, 1908	50,000.00
March 3, 1909	80,000.00
June 25, 1910	40,000.00
	1,355,000.00
Transferred from appropriations for improving passes of the Mississippi River	100.25
Transferred from appropriation for improving Southwest Pass, Mississippi River	23,305.33
Miscellaneous receipts deposited to the credit of the appropriation	4,053.67
Transferred by Treasury Department from appropriation for repairs and incidental expenses of light-houses, 1907, on account of services rendered by Engineer Corps in driving piles for Light-House Department	8.14
Deposited to credit of appropriation by chief signal officer, Atlanta, Ga., on account expenses incurred by Engineer Corps in testing cable	6.84
Amount received as refundment of overpayments during fiscal year 1908	40.63
Transferred by Treasury Department from appropriation for repairs and incidental expenses of light-houses, 1909, on account of services rendered by Engineer Corps in making repairs to light-house wharf and beacon	97.45
Transferred by Treasury Department from appropriation for collecting the revenue from customs, 1909, on account of services by Engineer Corps in driving piles at customs wharf, Port Eads, La	44.10

Transferred by Treasury Department from appropriation for repairs and incidental expenses of light-houses, 1909, on account of repairs to Head of Passes light by the Engineer Department	$24.11
Amount reclaimed on check, indorsement on which is alleged to have been forged	44.00
Amount refunded (by Colonel Ruffner), being part amount on forged check and voucher	140.21
Transferred by Treasury Department from appropriation for repairs and incidental expenses of light-houses, 1910, on account of repairs to light-house wharf by Engineer Department	16.00
	1,382,880.73
Reverted to Treasury	84,506.97
	1,298,373.76

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

I.

Name and address of contractor: Ellicott Machine Company, Baltimore, Md.
Work: Furnishing 2 sand pumps and 2 Y pipes for U. S. dredge *Sumter*.
Contract price: $4,277.
Date of contract: June 4, 1909.
Emergency contract.
Date of commencement: June 17, 1909.
Date of expiration: September 2, 1909.

II.

Name and address of contractor: Salmen Brick and Lumber Company (Limited), New Orleans, La.

Work: Furnishing and delivering piles and waling timbers at South Pass, Mississippi River.

	Each.
400 piles, 30 feet long	$2.92
150 piles, 40 feet long	3.90
100 piles, 45 feet long	4.38
100 piles, 50 feet long	4.90
50 piles, 60 feet long	5.85
100 waling timbers, 60 feet long	8.85

Date of contract: June 11, 1909.
Emergency contract.
Date of commencement: June 16, 1909.
Date of expiration: August 10, 1909.

III.

Name and address of contractor: Salmen Brick and Lumber Company (Limited), New Orleans, La.

Work: Furnishing and delivering lumber and shingles on the river bank or wharves in South Pass, Mississippi River.

20,483 feet b. m. long-leaf yellow-pine lumber, "A" grade, at $52 per M feet b. m.
15,000 feet b. m. long-leaf yellow-pine decking, "A" grade, at $60 per M feet b. m.
62,267 feet b. m. long-leaf yellow-pine lumber, "C" grade, at $22 per M feet b. m.
4,000 linear feet long-leaf yellow-pine flooring, "A" grade, at 2¼ cents per linear foot.
640 feet b. m. cypress lumber, first select, d 2 s, at $65 per M feet b. m.
2,500 cypress shingles, sawed, "Best," at $5.40 per M.

Date of contract: January 10, 1910.
Emergency contract.
Date of commencement: January 10, 1910.
Date of completion: February 9, 1910.
Time of completion waived for a reasonable period.

IV.

Name and address of contractor: Southern Sawmill Company (Limited), New Orleans, La.

Work: Furnishing and delivering piles and waling timbers at Port Eads, South Pass, Mississippi River.

	Each.
400 piles, 30 feet long	$2.91
100 piles, 45 feet long	4.37
50 piles, 60 feet long	5.84
20 piles, 70 feet long	6.82
50 waling timbers, 60 feet long	11.85

Date of contract: April 9, 1910.
Emergency contract.
Date of commencement: April 12, 1910.
Date of completion: June 8, 1910.
Time of completion waived for a resonable period.

V.

Name and address of contractor: Richard M. Murphy, New Orleans, La.
Work: Furnishing stone at South and Southwest Passes, Mississippi River.
See III of abstract of contracts for "Southwest Pass."

VI.

Name and address of contractor: Richard M. Murphy, New Orleans, La.

Work: Furnishing willows required for the works at South and Southwest Passes, Mississippi River, from August 3, 1909, to June 30, 1910.

See IV of abstract of contracts for "Southwest Pass."

VII.

Name and address of contractor: W. G. Coyle & Co., New Orleans, La.

Work: Furnishing and delivering coal for United States plant from September 18, 1909, to June 30, 1910.

See VI of abstract of contracts for "Southwest Pass."

VIII.

Name and address of contractor: Schwarzschild & Sulzberger Company, New Orleans, La.

Work: Furnishing and delivering meat for employees on United States plant from August 29 to December 31, 1909.

See V of abstract of contracts for "Southwest Pass."

COMMERCIAL STATISTICS FROM JANUARY 1, 1909, TO DECEMBER 31, 1909, NEW ORLEANS, LA.

Number and tonnage of vessels entered and cleared.

Class.	Entered.		Cleared.	
	Number.	Tonnage.	Number.	Tonnage.
FOREIGN-BOUND VESSELS.				
Steamers	1,001	1,950,230	1,036	2,186,114
Sailing vessels	24	19,766	21	16,330
COASTWISE VESSELS.				
Steamers	324	932,551	305	730,274
Sailing vessels			1	823
Total	1,349	2,902,547	1,363	2,933,541

Foreign exports and imports.

Articles.	Year ending December 31, 1909.	
	Tons.	Value.
EXPORTS.		
Agricultural implements	15,903	$779,255
All animals	1,702	226,356
Corn	173,843	4,297,100
Wheat	53,209	1,976,374
Flour	55,085	2,970,552
All other breadstuffs	145	365,127
Cars, carriages, vehicles, etc	632	63,274
Chemicals, drugs, dyes, etc	7,846	549,263
Copper pipe, ingots, etc	764	202,516
Cotton	426,325	95,043,403
Manufactures of cotton	3,758	725,718
Eggs	1,087	234,291
Fibers and manufactures of	144	53,573
Grease and soap stock	2,620	262,035
Machinery, machines, etc	1,925	96,262
Pipes and fittings	4,489	252,977
All manufactures of iron	16,665	740,300
Boots and shoes	1,181	503,815
Rosin	9,039	253,426
Turpentine	3,108	287,188
Cotton-seed cake and meal	127,394	3,240,644
Linseed cake and meal	51,685	1,331,605
Mineral oils, refined	9,069	426,828
Cotton-seed oil	37,256	4,048,518
Fruits and nuts	6,774	67,745
Hair, manufactures of	2	61,729
Instruments, etc., for scientific purposes	5	36,109
Paraffin wax	2,436	239,548
Canned beef	3,940	79,948
Pork, pickled	2,485	457,394
Beef, fresh, salted, etc	652	114,363
Tallow	4,971	498,680
Bacon and hams	610	161,434
Lard and lard compound	17,718	3,590,662
Other meat products	1,718	464,410
Fish and fish products	307	76,839
Paper and manufactures of	3,723	73,475
Dairy products, etc	322	148,395
Rice, bran, meal, etc	9,615	213,428
Salt	16,046	102,776
Timothy seed	1,022	94,420
Soap	3,252	221,569
Malt liquors	73	240.453
Molasses and sirup	10,779	280,023
Refined sugar	450	43,992
Tobacco	34,404	7,324,567
Beans, peas, onions, etc	6,025	276,830
Logs, boards, staves, etc	798,966	10,618,807
EXPORTS—continued.		
Furniture and other manufactures	71,332	$713,329
Glassware and tin, manufactures of	473	93,543
Wool and manufactures of	1,767	35,347
Corn oil	5,230	539,828
Cotton seed	2,483	57,960
Miscellaneous	6,046	906,923
Total exports	2,018,500	146,764,926
IMPORTS.		
Chemicals, drugs, and dyes	28,742	2,011,978
Coffee	169,798	25,058,455
Sisal grass	46,084	5,489,155
Bananas	302,444	3,438,447
Fruits and nuts	39.370	472,440
Oils and creosote	72,090	1,293,472
Seeds	1,296	400,259
Sulphur ore	14,945	51,476
Mahogany logs	27,533	327.479
Cotton, manufactures of	309	249,796
Earthen, stone, and china ware	2,908	290,825
Fibers and manufactures of	12,140	3,642,150
Sardines and all other fish	184	171,189
Glass and glassware	445	44,556
Matting	228	26,281
Iron and steel and manufactures of	12,294	614,720
Meats and dairy products	380	74,702
Rice	1,411	72,904
Rice flour	3,184	111,613
Salt	5,733	34,235
All liquors and wines	1,154	457,002
Molasses	45,342	335,482
Sugar	125,308	6,299,217
Tobacco and cigars	111	229,726
Toys, dolls, etc	580	208,828
Vegetables of all kinds	1,185	227,828
Wood, manufactures of	4,673	93,437
Miscellaneous	10,958	1,753,234
Total imports	930,829	53,480,886
Total exports and imports	2,949,329	200,245,812

Domestic shipments and receipts.

Articles.	Year ending December 31. 1909.	
	Tons.	Value.
SHIPMENTS.		
Rice	21,705	$868,200
Cotton	25,552	7,154,560
Cotton seed	625	18,750
Salt	3,606	12,621
Mineral products	15	195
Lumber	54,371	543,710
Oil	3,717	44,604
Sugar	67,474	4,147,760
Iron and steel	144	7,200
Wines	7,066	494,620
Coffee	481	72,150
Miscellaneous	41,371	6,144,550
Total shipments	226,127	19,508,920
RECEIPTS.		
Rice	30	1,200
Flour	18	1,080
RECEIPTS—continued.		
Cotton	302	$84,560
Asphalt	377	4,524
Mineral products	1,373	17,849
Lumber	201	2,010
Oil	720	7,920
Sugar	2,395	139,500
Iron and steel	17,891	894,550
Wines	333	23,310
Miscellaneous	169,626	25,433,950
Total receipts	193,266	26,610,453
Total shipments and receipts	419,393	46,119,373

S 3.

EXAMINATIONS AND SURVEYS AT SOUTH PASS, MISSISSIPPI RIVER.

For history of this work see current summary, page 495.

Examinations and surveys were made as frequently as necessary, particularly of the shoaler localities in the channel, to detect any changes which might take place, and, in case of shoaling liable to interfere with navigation, to correct it by dredging.

Continuous tidal records were obtained by means of automatic gauges at the mouth and head of the pass, and the same were tabulated. Records were also kept of the force and direction of the wind.

A series of observations to determine the volume of water discharged through each of the three passes (see report on Southwest Pass) was completed August 30, 1909, and indicates that South Pass carries 11.2 per cent of the volume below Cubits Gap, being an increase of 2 per cent since 1905.

Four[a] charts accompany this report and show the South Pass channel, 14 miles in length, from the main river to the Gulf of Mexico.

APPROPRIATIONS.

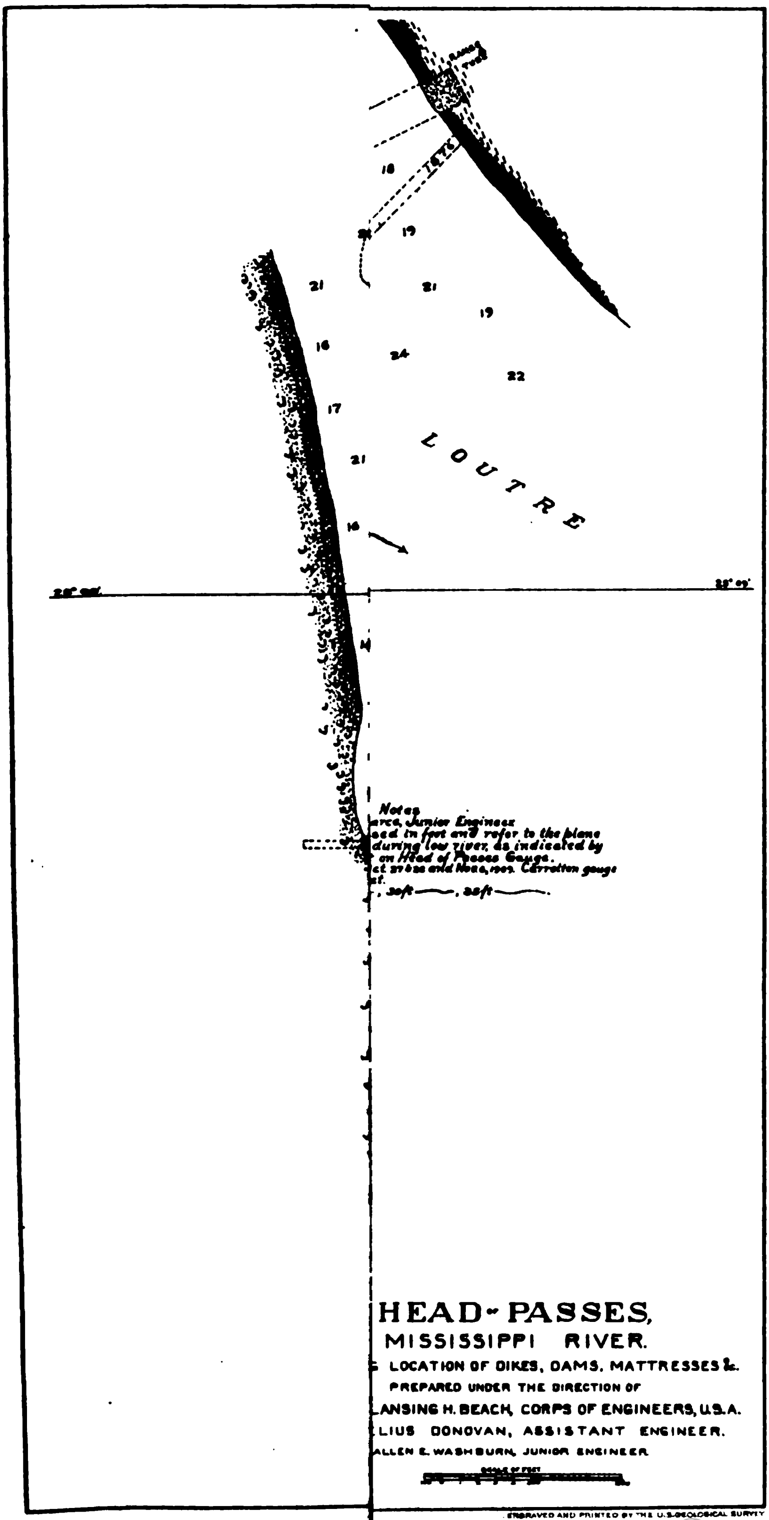
Examinations and surveys.

March 3, 1875	$5,000.00
May 1, 1876	2,100.28
August 14, 1876	15,000.00
Fiscal year 1878[b]	9,400.00
June 18, 1878	15,000.00
March 3, 1879	24,000.00
June 14, 1880	20,000.00
March 3, 1881	10,000.00
August 2, 1882	10,000.00
March 12, 1884	6,000.00
July 5, 1884	10,000.00
May 26, 1886	6,492.00
August 5, 1886	10,000.00
March 30, 1888	8,800.00
August 11, 1888	10,000.00
July 19, 1897	1,000.00
Fiscal year ending June 30:[c]	
1890	10,000.00
1891	10,000.00
1892	10,000.00
1893	10,000.00
1894	10,000.00
Fiscal year ending June 30—Continued.	
1895	$10,000.00
1896	10,000.00
1897	10,000.00
1898	10,000.00
1899	10,000.00
1900	10,000.00
1901	10,000.00
August 11, 1888, and June 13, 1902 (indefinite); 1903 to 1910, inclusive, $10,000 annually	80,000.00
	362,792.28
Amount reverting to Treasury, being unexpended balances in fiscal years 1896, 1899, 1900, and 1901	5,504.11
	357,288.17

[a] But two sheets printed, including "Head of Passes," and part of South Pass, extending from South Pass Light to the Gulf of Mexico.

[b] This amount was allotted from examinations, surveys, and contingencies of rivers and harbors during fiscal year 1878.

[c] The act of August 11, 1888, appropriated the sum of $100,000 per annum. (Omitted from previous reports.) These are carried instead of actual expenditures as heretofore. Where unexpended balances occur these amounts are included in amount reverting to Treasury.



Notes

arce, Junior Engineer
sed in feet and refer to the plane
during low river, as indicated by
on Head of Passes Gauge.
ct. 27&28 and Nov. 2, 1903. Carrollton gauge
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, 30 ft ———, 28 ft ———.

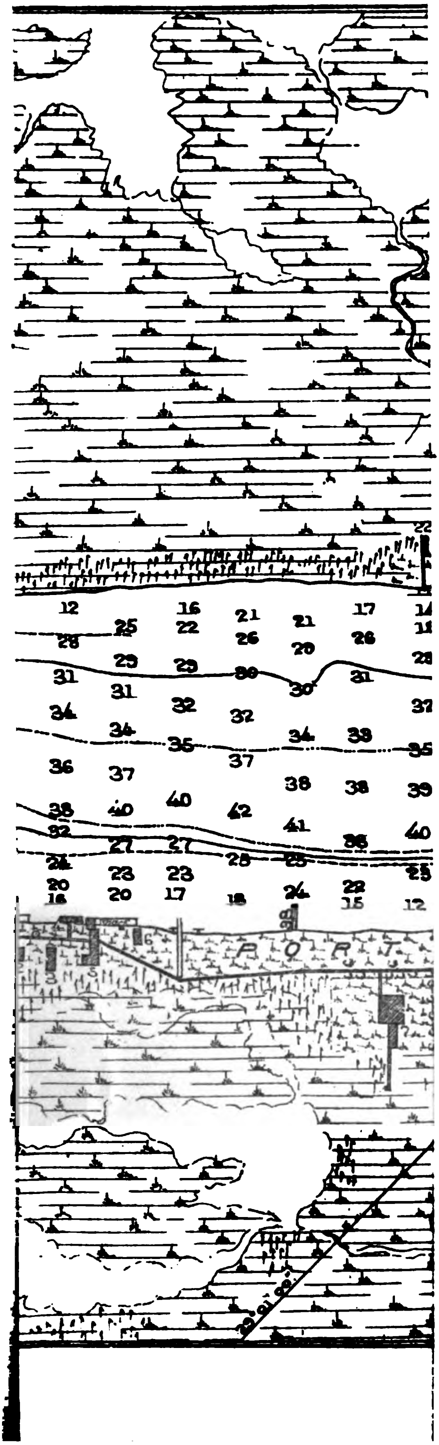
HEAD-PASSES,

MISSISSIPPI RIVER.

LOCATION OF DIKES, DAMS, MATTRESSES &c.
PREPARED UNDER THE DIRECTION OF
ANSING H. BEACH, CORPS OF ENGINEERS, U.S.A.
LIUS DONOVAN, ASSISTANT ENGINEER.
ALLEN E. WASHBURN, JUNIOR ENGINEER.

SCALE OF FEET

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY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P O R T

S 4.

IMPROVEMENT OF BAYOU PLAQUEMINE, GRAND RIVER, AND PIGEON BAYOUS, LOUISIANA.

For history of this work, see current summary, page 496.

PLAQUEMINE LOCK AND APPROACHES.

Plaquemine lock.—Under date of June 9, 1909, approved June 16, 1909, Plaquemine lock was placed under the status of finished works beginning July 1, 1909. A topographical survey of the reservation at the lock was made during the year.

Lock approaches.—The work of constructing the river approach and making back fill behind the bayou approach walls, under contract with W. O. Burton & Co., of New Orleans, La., dated August 7, 1906, and supplemented agreements dated November 15, 1907, and September 28, 1908, was practically finished, 30,055 cubic yards having been excavated at $1.05 per cubic yard, and two pile clusters built at the ends of the river approach walls, at a cost of $350 each. Payments aggregating $28,716.97 were made the contractor during the year. Final payment on this contract has not as yet been made, pending settlement of certain of the contractor's claims.

By means of a dredge hired at $200 per day, and the U. S. dredge and snag boat *Delatour*, an old cofferdam and a wrecked barge were removed from the river approach, at a total cost of about $1,680.25.

A survey was made of the river approach and of a portion of the river in the vicinity of the approach.

BAYOU PLAQUEMINE, GRAND RIVER, AND PIGEON BAYOUS.

Bayou Plaquemine.—Work of dredging Bayou Plaquemine, under contract dated July 15, 1899, with Charles Clarke & Co., and supplemental agreements dated March 30, 1905, and August 25, 1906, was continued during the year, resulting in the excavation of 206,454.9 cubic yards under the original contract, completing 69.4 per cent of the contract; of 74,368 cubic yards under the first supplemental agreement, completing it, and 28,972.4 cubic yards under the second supplemental agreement, completing this work.

The cost per cubic yard of material dredged under this contract and supplemental agreements was 13.98 cents per cubic yard, and payments aggregating $38,292.08 were made the contractor during the year.

A survey of the bayou below the lock has been in progress as dredging progresses.

Grand River.—The U. S. dredge *Ram* and U. S. dredge and snag boat *Delatour* operated in Grand River, dredging shoals and removing obstructions for maintenance of the waterway from Plaquemine to Morgan City, removing 439 snags, logs, fallen and overhanging trees, and dredging 1,200 cubic yards of material that had filled in the channel in Bay Natchez.

A pile driver was leased in May, 1910, and during May and June 65 piles were driven in Bay Natchez and Flat Lake to replace certain of the piles originally driven to mark the channel. The piling used were some that had been left over from the construction of the lock approaches and were the property of the United States.

The sum of $3,047.64 was expended on the work.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

August 11, 1888	$100,000.00
September 19, 1890	100,000.00
July 13, 1892	150,000.00
August 18, 1894	110,000.00
June 3, 1896	20,000.00
June 4, 1897	350,000.00
March 3, 1899	400,000.00
June 6, 1900	200,000.00
March 3, 1901	210,000.00
March 3, 1905	35,000.00
June 30, 1906	100,000.00
March 2, 1907	100,000.00
June 29, 1907, allotted from emergency appropriation, act of March 3, 1905	10,000.00
June 29, 1907, allotted from emergency appropriation, act of March 2, 1907	10,000.00
June 29, 1907, allotted from appropriation, operating and care of canals, act of July 5, 1884	15,000.00
March 3, 1909	50,000.00
June 25, 1910	10,000.00
Receipts from sales during the fiscal year	25.15
	1,970,025.15
Reverted to Treasury, balance from appropriation, operating and care, allotted June 29, 1907	169.13
	1,969,856.02

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

I.

Name and address of contractor: Charles Clarke & Co., Galveston, Tex.

Work: Dredging to enlarge bed of Bayou Plaquemine from the railroad bridge to deep water below Dardennes Bend. Estimated amount of material to be removed, 1,027,509 cubic yards.

Price: 13.98 cents per cubic yard.

Date of contract: July 15, 1899.

Date of approval: September 13, 1899.

Date of commencement: November 12, 1899.

Date of completion: June 30, 1901; extended to June 30, 1902; time limit waived.

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[a] Exclusive of the balance unexpended July 1, 1910.

Supplemental agreement, modifying contract dated July 15, 1899.

Work: Provides for modification of method of work on contract of July 15, 1899, for enlarging bed of Bayou Plaquemine and for certain additional work, no change in contract price being involved. Estimated number of additional cubic yards of material provided for by this supplemental contract, 80,000.

Date of agreement: March 30, 1905.

Date of approval: By the Chief of Engineers, April 7, 1905; by the Secretary of War, April 11, 1905.

Supplemental agreement, modifying contract dated July 15, 1899.

Work: Dredging 45,000 cubic yards of earth at river approach, Plaquemine lock.

Price: 13.98 cents per cubic yard.

Date of agreement: August 25, 1906.

Date of approval: By the Chief of Engineers and Secretary of War, August 30, 1906.

Date of commencement: April 25, 1909. The work under this contract is to be done at the same time and in connection with the completion of contract dated July 15, 1899, for dredging and enlarging bed of Bayou Plaquemine.

II.

Name and address of contractor: W. O. Burton & Co., New Orleans, La.

Work: Excavation and construction of river approach and back fill of lock at Plaquemine, La.

Price: Moving levee, 30 cents per cubic yard; sand and gravel or broken stone for concrete, $2 per cubic yard; furnishing cement for concrete, mixing and placing concrete, $3 per cubic yard; piles, $3 each; driving piles, $1.50 per pile; excavating for approach and placing earth, $1.05 per cubic yard; furnishing and setting in place guide piles, $75 per cluster.

Date of contract: August 7, 1906.

Date of approval: August 29, 1906.

Date of commencement: September 25, 1906.

Date of expiration: Four months from the time after May 1, 1907, that the Mississippi River gauge reads 20 feet at Plaquemine, La.

Supplemental agreement, modifying contract dated August 7, 1906.

The agreement provides for extension of time limit for completion until such time as recommendations of Board of Engineers can be carried out.

No change in contract prices involved.

Date of agreement: November 15, 1907.

Date of approval: By Chief of Engineers, January 21, 1908; by Secretary of War, January 22, 1908.

Supplemental agreement, modifying contract dated August 7, 1906.

Work: Provides that no further delivery of material be made or work of driving piles or building the river approach walls be performed. Constructing two pile clusters, $350. Excavating for approach and placing earth, $1.05 per cubic yard. For relinquishing profits on uncompleted portion of work, removing plant, etc., $10,000.

Date of agreement: September 28, 1908.

Date of approval: By Chief of Engineers, October 13, 1908; by Secretary of War, October 22, 1908.

COMMERCIAL STATISTICS, FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	28	1,834	46,589
Barges	31	1,037	150,557
Total	59	2,871	197,146

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Cord wood	2,600	$7,920	Logs	641,202	$1,357,360
Logs and lumber	220,000	480,000	Cord wood	4,905	14,715
Cotton and cotton seed	52	4,500	Cooperage	1,075	27,283
Hides, furs, and moss	500	20,000	Staves	1,750	14,000
Fuel oil	850	6,800	Coal	1,920	7,680
Fish	1,325	132,500	Gravel	2,938	5,876
Coal	740	3,000	Machinery	400	40,000
Machinery	294	52,100	Bricks	112	450
Molasses	601	17,970	Potatoes	15	450
Cane	400	16,000	Hides, furs, and moss	619	87,345
Potatoes	270	8,100	Molasses	8	240
Oats and corn	210	2,000	Eggs	2	520
Shingles and laths	42	1,060	Fuel oil	40,765	326,120
Rice	100	4,000	Miscellaneous	2,275	227,500
Tar	35	455			
Junk	20	200	Total receipts	697,986	2,109,539
Railroad ties	738	2,400			
Sugar	2,100	168,000			
Feed, ground	98	2,500	Total shipments and receipts	937,950	3,835,596
Live stock	84	10,640			
Staves	500	4,000			
Railroad iron	837	25,112			
Miscellaneous	7,568	756,800			
Total shipments	239,964	1,726,057			

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be fairly accurately given as 28,910,000 ton miles.

Since the opening of the lock considerable traffic has developed between New Orleans and Baton Rouge and points on Bayou Teche and the lower Atchafalaya River.

A boat made regular trips between Baton Rouge and points on the lower Atchafalaya during the first part of the fiscal year, but was compelled to discontinue, due to low water in Bayou Plaquemine, where the dredging had not been completed.

Another boat line has since been established between New Orleans and Bayou Teche points, as indicated in the report on Bayou Teche.

S 5.

OPERATING AND CARE OF PLAQUEMINE LOCK, LOUISIANA.

The permanent force was organized in August, 1909, and as authorized consists of 1 lock master, 1 assistant lock master, 4 gatemen, 4 lockmen, and 1 extra lockman.

A deposit of approximately 7,000 cubic yards of sediment in the river approach to the lock was removed by the U. S. boat *Delatour* in September, October, and November, 1909, and about 3,000 cubic yards by the U. S. dredge *Ram* in May and June, 1910.

A new electric light plant for lighting power house and lock was installed in March, 1910, at a cost of $1,415.

Levels and measurements were taken monthly to determine whether settlement of the lock and spreading of the walls continued. It was found that during the year the walls had spread at their tops from 0.035 foot to 0.085 foot, the average being 0.066 foot, and that settlement of from 0.010 foot to 0.094 foot had taken place in the structure, the average settlement being 0.049 foot.

An explosion of gasoline in the power house on August 28, 1909, caused the death of the lock master and the injury of two lockmen.

There were 3,831 lockages made during the year, the time required for a lockage varying from thirty-three minutes during high-water season to ten minutes during low-water season.

The greatest number of lockages consisted of scows with dredged material from the bayou below, which is being dumped by the contractor in deep water in the Mississippi River.

The maximum and minimum difference of level between the Mississippi River and Bayou Plaquemine at the lock for each month of the fiscal year are shown in the following table:

Date.	Maximum.			Minimum.		
	River gauge.	Bayou gauge.	Difference.	River gauge.	Bayou gauge.	Difference.
1909.	*Feet.*	*Feet*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
July	37.7	18.2	19.5	33.5	17.7	15.8
August	35.5	17.5	18.0	16.5	14.0	2.5
September	19.7	14.6	5.1	14.8	14.8	.0
October	14.1	12.2	1.9	12.3	11.8	.5
November	17.7	12.8	4.9	12.5	11.7	.8
December	21.6	14.3	7.3	16.3	13.5	2.8
1910.						
January	31.0	15.8	15.2	15.2	14.2	1.0
February	33.5	17.2	16.3	23.9	16.9	7.0
March	35.8	18.0	17.8	24.8	16.8	8.0
April	35.2	18.0	17.2	26.3	16.9	9.4
May	30.9	17.0	13.9	26.4	16.8	9.6
June	32.1	17.3	14.8	29.5	17.0	12.5

Expenditures during the year.

Salaries and wages for regular hired labor force	$9,250.22
Miscellaneous supplies and services, including fuel, oils, tools, and appliances, also telephone service, sundry supplies or services	3,607.98
Miscellaneous repairs to lock, including repairs to lock-operating machinery, etc	928.24
Contingencies	4,952.84
Total	18,739.28

COMMERCIAL STATISTICS.

Lockages made and traffic passed at Plaquemine Lock during the six months ending December 31, 1909.

	Up.	Down.		Up.	Down.
Lockages ... number	662	662	Gravel ... tons	....	2,850
Steamboats ... do	42	35	Lumber ... do	24	100
Tugs, scows. and barges ... do	562	545	Molasses ... do	599	....
Motor boats and other craft ... number	147	144	Passengers ... number	371	401
Coal ... tons	20	720	Iron and steel products ... tons	85	400
Fuel oil ... do	....	1,000	Sand ... do	6	130
General merchandise ... do	2,071	1,786	Ties ... do	2,300	....

Statistics for Plaquemine Lock are included in those for Bayou Plaquemine.

S 6.

IMPROVEMENT OF BAYOU TECHE, LOUISIANA.

For history of this work, see current summary, page 500.

It having been decided by the Comptroller of the Treasury that personal bonds would fulfill the conditions of the act of March 2, 1907, requiring that the United States be guaranteed against claims for damages from overflow due to the construction of the lock and dam authorized, a form of bond prepared by the Judge-Advocate-General of the Army was forwarded to parties interested in the improvement and bonds to the amount of $10,000 secured in September, 1909, and accepted by the Judge-Advocate-General.

From October to December, 1909, test borings aggregating 555 feet penetration were made at the lock site, the greatest depth reached being 84 feet below the low-water plane.

The cost of the borings was $599.40, the unit cost being $1.08 per foot penetration.

The borings show the foundation for the lock and dam to consist of a mixture of sand and clay in varying proportions.

Plans and specifications were prepared for a concrete lock 36 feet wide, with an available length of 160 feet and a depth of 8 feet at low water over the sills; for a timber crib dam with a height of 8 feet above low water, with concrete abutment; and for a frame lock-keeper's dwelling at the lock site.

The work was advertised for bids, but as the only one received was excessive, it was rejected and readvertisement authorized.

There has been expended during the year for engineering and office expenses the sum of $2,451.36; for printing, $62.50; and for collection of commercial statistics, the sum of $24.95.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$20,000
For maintenance of improvement	40,000
	[a] 60,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

July 11, 1870	$17,500.00
June 14, 1880	6,000.00
March 7, 1881	20,000.00
July 5, 1884	6,500.00
September 19, 1890	5,000.00
August 18, 1894	6,000.00
June 3, 1896	10,000.00
March 3, 1899	10,000.00
June 13, 1902 (maintenance)	7,500.00
March 3, 1905 (maintenance)	7,500.00
March 2, 1907 (lock and dam and maintenance)	130,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

January 11, 1908, amount allotted from appropriation for emergencies in river and harbor works act of March 2, 1907	$500.00
March 3, 1909	5,000.00
Receipts from sales of property, as shown on page 556, Report Chief of Engineers, 1872	448.75
June 25, 1910	50,000.00
	281,948.75
Amounts reverted to Treasury (see p. 556, Report of Chief of Engineers, 1872)	5,022.48
	276,926.27

COMMERCIAL STATISTICS FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	32	2,858	200,011
Barges	89	2,427	319,811
Total	121	5,285	519,822

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Sugar	25,693	$2,313,370	Machinery	889	$88,900
Molasses	11,782	353,460	Fertilizers	200	4,000
Cotton and cotton-seed products	4,028	87,900	Cooperage	120	20,400
Cord wood	6,145	18,435	Coal	3,850	15,400
Rice	1,785	71,400	Fuel oil	83,000	606,000
Junk	430	4,300	Cane	42,600	213,000
Brick	242	1,100	Logs	757,790	1,653,375
Lumber	2,828	28,280	Lime and cement	10	100
Machinery	67	6,240	Gravel and sand	2,500	5,000
Cane	43,600	178,000	Corn and oats	491	10,180
Shingles	75	1,500	Feed, ground	600	12,000
Potatoes	15	450	Brick	50	225
Cross-ties	1,200	5,000	Miscellaneous	7,935	793,500
Miscellaneous	1,200	120,000	Total receipts	900,035	3,422,080
Total shipments	99,090	3,189,435	Total shipments and receipts	999,125	6,611,515

Time did not permit the collection of accurate ton mileage statistics, but from available data these may be fairly accurately given as 33,534,000 ton miles.

During the past fiscal year a boat line known as the Sugar Belt Transportation Company has been established between New Orleans and points on Bayou Teche as far up as New Iberia. Freight is carried in barges towed by steamboats, and trips are made about every five days. The route from New Orleans to Bayou Teche is by way of the Plaquemine Lock and is about 250 miles long. Freight rates by this line are from 15 to 20 per cent lower than the corresponding railroad rates, though the railroad haul is less than half as great as that by water.

S 7.

IMPROVEMENT OF INLAND WATERWAY, FRANKLIN TO MERMENTAU, AND FROM MERMENTAU RIVER, LOUISIANA, TO SABINE RIVER, LOUISIANA AND TEXAS.

(*a*) *Waterway, Franklin to Mermentau, La.*—For history of this work, see current summary, page 503.

The work of dredging that portion of the waterway between Vermilion Bay and Grand Lake, under contract dated September 19, 1908, was delayed from July 1, 1909, to December 3, 1909, pending the securing of new plant by the contractor to replace that destroyed by fire in June, 1909.

Records of this office as to the quantities dredged were lost in the fire which destroyed the dredge, and a new survey had to be made of the completed channel, from which it was found that to July 1, 1909, 33,340 feet of channel in and west of Vermilion Bay had been completed and 96,606.22 cubic yards excavated.

The contractor resumed work on the Vermilion Bay end of the channel December 3, 1909, and a second dredge was started on the Grand Lake end on January 24, 1910.

By June 30, 1910, the waterway had been nearly completed, about 3 miles of marsh and the portions within Grand Lake, White Lake, and three small lakes between them being all that remained to be done.

There was removed during the year, in accordance with the terms of the contract, 337,896.53 cubic yards, at a cost of 7½ cents per cubic yard, and the sum of $20,189.77 was paid the contractor.

Time limit on the contract was, in April, 1910, extended for a reasonable period.

Data from surveys made during the previous fiscal year was compiled and maps prepared, in order to determine the best location for the portion of the waterway between Bayou Teche and Vermilion Bay.

The sum of $1,851.78 was expended during the year for engineering and office expenses.

APPROPRIATIONS.

March 2, 1907	$89,292.00
May 27, 1908	100,000.00
Receipts from sales of blueprints	5.50
March 4, 1909	100,000.00
June 25, 1910	12,500.00
Receipts from miscellaneous sources	20.65
	301,818.15

(*b*) *Inland waterway from Mermentau River, Louisiana, to Sabine River, Louisiana and Texas.*—For history of this work, see current summary, page 505.

No field work was done during the year.

APPROPRIATION.

June 25, 1910	$100,000

ABSTRACT OF CONTRACT IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of contractor: John Andersen, Gulfport, Miss.
Work: Dredging waterway from Franklin to Mermentau, La.
Contract price: $0.07¾ per cubic yard.
Date of contract: September 19, 1908.
Date of approval: October 6, 1908.
Date of commencement: April 14, 1909.
Date of completion: April 13, 1910 (waived for a reasonable period).

CONSOLIDATED.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	[a]$100,000
For maintenance of improvement	[b]12,500
	[c]$112,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

S 8.

IMPROVEMENT OF MOUTH AND PASSES OF CALCASIEU RIVER, LOUISIANA.

For history of this work, see current summary, page 505.

No field work was done during the year.

The combined dredge and snag boat *Delatour*, constructed under contract for the maintenance of this and other improvements in the district under project for expenditure of available funds approved April 2, 1907, was completed and equipped for service in August, 1909, and the sum of $4,133.23 expended during the year on its construction and equipment from the appropriations for this stream.

Final payment on the contract for construction of the boat has not yet been made, pending settlement of certain claims against the contractor on account of defects which developed after its delivery.

There was expended during the year for engineering and office expenses the sum of $225.

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[a] Improving inland waterway, Mermentau River, Louisiana, to Sabine River, Louisiana and Texas.

[b] Improving waterway, Franklin to Mermentau.

[c] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

June 10, 1872	$15,000.00
March 3, 1881	15,000.00
August 2, 1882	10,000.00
July 5, 1884	6,500.00
August 11, 1888	10,000.00
September 19, 1890	75,000.00
June 13, 1892	100,000.00
August 18, 1894	90,000.00
June 3, 1896	80,000.00
March 3, 1899	35,000.00
June 13, 1902	75,000.00
March 3, 1905	100,000.00
March 2, 1907, allotted April 2, 1907	25,000.00
March 3, 1909, allotted April 7, 1909	8,000.00
Refundment of overpayment	.45
Receipts for sale of blueprints	2.50
June 25, 1910	5,000.00
	649,502.95
Reverted to Treasury, being balance unexpended from appropriation of 1872	76.55
	649,426.40

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDED JUNE 30, 1910.

I.

Name and address of contractor: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

Work: Construction and delivery of one wooden hull combined hydraulic dredge and snag boat.

Contract price: $37,400.

Date of contract: December 17, 1907.

Date of approval: January 29, 1908.

Date of commencement: March 2, 1908.

Date of completion: December 1, 1908.

Supplemental agreement, modifying contract dated December 17, 1907.

Work: Changes in construction of boat necessary to reduce its draft: Hull to be 112 feet long instead of 102; furnish 1 bath tub and 2 shower baths; 2 flush-tank water-closets and 1 basin; ground glass in all transoms in bathroom windows; blinds at front cabin openings and at bathroom windows; screens of brass wire cloth over the outside openings of the cabin; a range in the galley; all necessary kevels, not to exceed 6; steam-heating coils in each cabin and pilot house; boilers to be what is known as the "Mississippi River type" instead of the Scotch marine; engines operating pump to have 12 by 22 inch cylinder, 14-inch stroke.

Amount of agreement: $1,750.

Date of agreement: October 24, 1908.

Date of approval: By Chief of Engineers, December 8, 1908; Secretary of War, December 11, 1908.

Date of completion extended to April 30, 1909 (waived for a reasonable period).

Supplemental agreement, modifying contract dated December 17, 1907.

Work: Changes in position of boilers, smokestack piping, and bulkheads upon upper deck, in order to bring the boat more nearly to an even keel.

Liquidated damages and cost of superintendence and inspection waived for a period of fifteen days.

Amount of agreement: $662.45.

Date of agreement: August 9, 1909.

Date of approval: By Chief of Engineers, August 24, 1909; Secretary of War, September 2, 1909.

COMMERCIAL STATISTICS FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	12	1,178	47,898
Sailing vessels	14	168	2,928
Barges	11	465	18,455
Total	37	1,811	69,281

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Lumber and shingles	2,704	$27,340	Logs	511,390	$1,115,761
Cotton and cotton seed	299	73,220	Machinery	130	7,800
Cord wood	2,928	8,804	Fuel oil	738	4,946
Sand and shells	27,000	54,000	Feed and fertilizer	45	925
Live stock	627	41,500	Sugar	40	3,600
Hides, furs, and wool	366	124,250	Shingles	160	7,200
Rice	6,148	243,960	Potatoes	80	2,400
Brick	157	600	Miscellaneous	200	20,000
Turpentine	210	25,000			
Rosin	250	8,000	Total	512,783	1,162,632
Rosin oil	11	450			
Potatoes	20	600	Grand total	554,551	1,885,556
Oats	30	1,000			
Poultry and eggs	103	22,700			
Miscellaneous	915	91,500			
Total	41,768	722,924			

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be given fairly accurately as 14,450,000 ton-miles.

S 9.

IMPROVEMENT OF BOGUE CHITTO, CHEFUNCTE RIVER, BOGUE FALIA, TICKFAW RIVER AND TRIBUTARIES, AMITE RIVER, AND BAYOU MANCHAC, LOUISIANA.

(*a*) *Bogue Chitto, Louisiana and Mississippi.*—For history of this work, see Annual Report of the Chief of Engineers for 1909, page 454, in which recommendation is made that appropriation for this stream be discontinued.

(*b*) *Chefuncté River and Bogue Falia, Louisiana.*—For history of this work, see current summary, page 508.

The combined dredge and snag boat *Delatour*, constructed under contract for maintenance of this and other improvements in this district, under project for expenditure of available funds approved April 11, 1907, was completed and equipped for service in August, 1909. Final payment on the contract for construction of the boat has not yet been made, pending settlement of certain claims against the contractor on account of defects which developed after its delivery.

A hurricane which occurred on September 20, 1909, blew a number of trees into these streams.

A survey was made of the shoals in the Bogue Falia in December, 1909, and of the bar at the mouth of the Chefuncte in March, 1910.

The U. S. snag boat *Pearl*, belonging to the Mobile, Ala., district, was borrowed and began work in April, 1910, at Covington, on the Bogue Falia, and worked to the mouth of the Chefuncte, removing 1,246 logs, snags, fallen and overhanging trees, and clearing the banks for several miles along the Bogue Falia, completing the work in May, 1910.

Plans and specifications were prepared and approved in May, 1910, for dredging a channel 7 feet deep at extreme low water and as wide as available funds would permit over the bar at the mouth of the Chefuncte River, and for dredging channels 60 feet wide and 6 feet deep through shoals in the Bogue Falia.

Bids for this work were opened June 10, 1910, and contract entered into June 22, 1910, at 19½ cents per cubic yard. No work under this contract was done during the year.

APPROPRIATIONS.

BOGUE CHITTO.

September 19, 1890	$5,000.00
July 13, 1892	5,000.00
August 18, 1894	5,000.00
June 3, 1896	5,000.00
March 3, 1899	5,000.00
June 13, 1902 (allotted June 30, 1902)	3,000.00
	28,000.00
April 8, 1907, amount transferred to improving Tickfaw River and tributaries	157.46
	27,842.54

CHEFUNCTE RIVER AND BOGUE FALIA.

March 3, 1881	$1,500.00
August 2, 1882	1,500.00
August 5, 1886	2,500.00
September 19, 1890	1,000.00
July 13, 1892	1,000.00
August 18, 1894	1,000.00
June 3, 1896	1,000.00
March 3, 1899	1,000.00
June 13, 1902	3,000.00
March 3, 1905 (allotted May 5, 1905)	500.00
March 2, 1907 (allotted April 8, 1907)	8,000.00
March 3, 1909 (allotted March 27, 1909)	2,000.00
June 25, 1910	5,000.00
	29,000.00
February 24, 1903, amount transferred to allotment for "Improving Amite River and Bayou Manchac, Louisiana"	1,194.01
	27,805.99
April 30, 1910, amount transferred from allotment for Amite River and Bayou Manchac	5,000.00
	32,805.99

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of bidder: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

(For abstract, see report for "Mouth and passes of Calcasieu River, La.")

COMMERCIAL STATISTICS FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	11	2,291	80,914
Sailing vessels	24	690	16,740
Barges	22	1,238	103,863
Total	57	4,219	201,517

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Logs and lumber	61,969	$461,696	Coal	50	$200
Sand and brick	170,213	116,608	Machinery	3	450
Cotton	188	6,600	Live stock	269	25,800
Poultry and eggs	2	234	Miscellaneous	7,137	718,700
Molasses and rice	16	580			
Hides and furs	28	1,447	Total receipts	7,459	740,150
Rosin, turpentine, and tar	779	34,543			
Cord wood	834	3,336	Grand total	241,977	1,410,689
Junk	91	910			
Shingles	3	85			
Miscellaneous	445	44,500			
Total shipments	234,518	670,539			

Time did not permit the collection of accurate ton-mileage statistics, but from the data available these may be given fairly accurately as 1,532,000 ton miles.

(*c*) *Tickfaw River and tributaries, Louisiana.*—For history of this work, see current summary, page 511.

No field work was done during the fiscal year.

Expenditures were for a proportionate part of the cost of the combined snag boat and dredge *Delatour* and for office expenses.

APPROPRIATIONS.

March 3, 1881	$2,000.00
August 2, 1882	2,000.00
August 5, 1886	2,000.00
August 11, 1888	1,000.00
September 19, 1890	1,000.00
July 13, 1892	1,000.00
August 18, 1894	1,000.00
June 3, 1896	1,000.00

March 3, 1899	$1,000.00
June 13, 1902 (allotted June 20, 1902)	1,000.00
March 3, 1905 (allotted May 5, 1905)	1,000.00
March 2, 1907 (allotted April 8, 1907)	6,000.00
March 3, 1909 (allotted March 27, 1909)	2,000.00
June 25, 1910	3,000.00
	25,000.00
April 8, 1907, amount transferred from allotment for "Improving Bogue Chitto, Louisiana"	157.46
	25,157.46

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of bidder: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

For abstract, see report for "Mouth and passes of Calcasieu River, Louisiana."

COMMERCIAL STATISTICS, FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	6	412	13,906
Sailing vessels	29	450	7,134
Barges	13	60	6,322
Total	48	922	27,362

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Lumber	35,610	$271,614	Logs	2,250	$60,000
Cord wood	4,020	14,070	Coal	40	160
Cotton and cotton seed	31	5,820	Brick	112	1,375
Hides and wool	11	3,610	Corn	222	9,829
Poultry and eggs	2	376	Feed, ground	18	360
Rice	48	1,920	Live stock	10	1,500
Piling	2,242	8,968	Miscellaneous	2,639	263,900
Staves	148	29,600			
Shingles and laths	47	815	Total	5,291	337,124
Live stock	41	5,550			
Miscellaneous	80	8,000	Grand total	47,571	687,467
Total	42,280	350,343			

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be given fairly accurately as 587,500 ton miles.

(*d*) *Amite River and Bayou Manchac, Louisiana.*—For history of this work, see current summary, page 513.

The combined dredge and snag boat *Delatour*, constructed under contract for maintenance of this and other improvements in this district under project for expenditure of available funds approved April 11, 1907, was completed and equipped for service in August, 1909.

Final payment on the contract for construction of the boat has not yet been made, pending settlement of certain claims against the contractor, on account of defects which developed after its delivery.

The U. S. snag boat *Pearl*, belonging to the Mobile, Ala., district, was borrowed and began work in June, 1910, on Bayou Manchac, and by June 30 had worked from Wards Creek to the mouth of the bayou, 10½ miles, removing 408 logs, snags, fallen and overhanging trees.

APPROPRIATIONS.

June 14, 1880	$8,000.00
March 3, 1881	5,000.00
August 5, 1886	2,000.00
August 11, 1888	5,000.00
September 19, 1890	3,800.00
July 13, 1892	2,500.00
August 18, 1894	2,500.00
June 3, 1896	2,500.00
March 3, 1899	2,500.00
June 13, 1902 (allotted June 20, 1902)	2,500.00
March 3, 1905 (allotted May 5, 1905)	5,000.00
March 2, 1907 (allotted Apr. 8, 1907)	20,000.00
March 3, 1909 (allotted Mar. 27, 1909)	1,000.00
June 25, 1910	2,000.00
	64,300.00
February 24, 1903, amount transferred from allotment for "Improving Chefuncte River and Bogue Falia, Louisiana"	1,194.01
	65,494.01
April 30, 1910, amount transferred to allotment for Chefuncte River and Bogue Falia, Louisiana	5,000.00
	60,494.01

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of contractor: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

For abstract, see report for "Mouth and passes of Calcasieu River, La."

COMMERCIAL STATISTICS, FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	4	112	4,702
Sailing vessels	26	532	7,772
Barges	5	36	1,794
Total	35	680	14,268

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Logs and lumber	35,692	$214,391	Live stock	39	$7,500
Shingles and laths	5,586	17,449	Coal	380	1,520
Staves	4,000	79,840	Fertilizers	112	2,240
Hides, furs, wool, and moss.	38	5,830	Machinery	7	700
Cotton and cotton seed	1,000	155,760	Miscellaneous	6,310	631,000
Cord wood	2,447	8,564			
Poultry and eggs	12	2,980	Total	6,848	642,960
Potatoes	40	1,227			
Piling	350	1,400	Grand total	56,745	1,169,121
Molasses	4	120			
Junk	380	3,800			
Miscellaneous	348	34,800			
Total	49,897	526,161			

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be fairly accurately given as 2,300,500 ton-miles.

S 10.

IMPROVEMENT OF CHANNEL, BAY, AND PASSES OF BAYOU VERMILION AND MERMENTAU RIVER AND TRIBUTARIES, LOUISIANA.

(*a*) *Channel, Bay, and Passes of Bayou Vermilion.*—For history of this work, see current summary, page 516.

The combined dredge and snag boat *Delatour*, constructed under contract for maintenance of this and other improvements in this district under project for expenditure of available funds approved April 11, 1907, was completed and equipped for service in August, 1909.

Final payment on the contract for construction of the boat has not yet been made, pending settlement of certain claims against the contractor on account of defects which developed after its delivery.

The *Delatour* began work in Bayou Vermilion in December, 1909, and operated from the mouth to the railroad bridge at Lafayette, 52 miles, removing 4,695 snags, fallen and overhanging trees, 2 old ferry approaches, 1 sunken barge, 44 old bridge piles, and dredging 10,862 cubic yards of material from the bayou.

Owing to the extreme low water, due to a prolonged drought and the prevailing northerly winds, the progress of the work in the upper 12 miles was much delayed in the months of April and May, 1910, as, on some of the shoals, a depth of not more than 6 inches existed at times. Hydraulic dredging was slow and difficult, due to the large number of submerged logs and snags encountered.

The *Delatour* reached the mouth of the bayou in May, 1910, and dredged a channel 5,200 feet long, 60 feet wide, and 5 feet deep at mean low water through the bar, removing 15,905 cubic yards. This channel was also marked by piling.

These operations have resulted in a channel 5 feet deep at ordinary low water in the bayou from Vermilion Bay for about 40 miles upstream and 3 feet deep for the upper 12 miles of the bayou.

APPROPRIATIONS.

June 14, 1880	$5,000.00
March 3, 1881	4,900.00
July 13, 1892	7,500.00
August 18, 1894	5,000.00
June 3, 1896	1,000.00
March 3, 1899	2,500.00
June 13, 1902 (allotted)	9,000.00
March 3, 1905 (allotted May 23, 1905)	1,000.00
March 2, 1907 (allotted Apr. 3, 1907)	7,000.00
March 3, 1909 (allotted Mar. 27, 1909)	2,500.00
June 25, 1910	3,000.00
December 31, 1903, amount transferred from allotment for "Improving Mermentau River and tributaries, Louisiana"	200.00
January 8 and May 7, 1910, amounts transferred from allotment for "Mermentau River and tributaries, Louisiana"	10,000.00
	58,600.00

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of contractor: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

For abstract, see report for "Mouth and passes of Calcasieu River, Louisiana."

COMMERCIAL STATISTICS, FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	6	208	7,904
Barges	12	160	1,120
Total	18	368	9,024

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Sugar cane	17,000	$50,000	Brick, lime, and cement	365	$12,389
Rice	2,800	84,000	Fuel oil	2,700	18,000
Cotton and cotton seed	2,145	308,000	Lubricating oils	30	4,000
Sugar and molasses	295	21,000	Lumber and shingles	330	3,400
Cord wood	3,000	7,500	Coal	500	3,000
Cattle, furs, and hides	344	40,400	Fertilizers	200	4,400
Moss	75	450	Feed, ground	53	1,600
Poultry and eggs	6	1,380	Machinery	25	1,500
Sand and shells	225	500	Miscellaneous	1,000	100,000
Oysters	500	2,000	Total	5,203	148,289
Total	26,390	515,230	Grand total	31,593	663,519

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be fairly accurately given as 640,000 ton-miles.

(*b*) *Mermentau River and tributaries.*—For history of this work, see current summary, page 518.

No field work was done during the year.

The combined dredge and snag boat *Delatour*, constructed under contract for the maintenance of this and other improvements in this district under project for expenditure of available funds approved April 5, 1907, was completed and equipped for service in August, 1909.

Final payment on the contract for construction of the boat has not yet been made, pending settlement of certain claims against the contractor on account of defects which developed after its delivery.

APPROPRIATIONS.

July 13, 1892		$7,500.00
August 18, 1894		5,000.00
June 3, 1896		5,000.00
March 3, 1899		6,115.25
June 13, 1902		2,500.00
March 3, 1905 (allotted)		2,000.00
March 2, 1907 (allotted)		18,000.00
March 3, 1909 (allotted March 27, 1909)		1,500.00
June 25, 1910		2,000.00
		49,615.25
December 31, 1903, amount transferred to allotment for "Improving channel, bay, and passes of Bayou Vermilion, Louisiana"	$200.00	
January 8 and May 7, 1910, amount transferred to allotment for "Improving channel, bay, and passes of Bayou Vermilion, Louisiana"	10,000.00	
		10,200.00
		39,415.25

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of contractor: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

For abstract, see report for "Mouth and passes of Calcasieu River, Louisiana."

COMMERCIAL STATISTICS, FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	6	629	10,492
Sailing vessels	8	128	2,432
Barges	27	2,209	9,026
Total	41	2,966	21,950

Shipments and receipts by water.

Articles.	Tons.	Value.	Articles.	Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Cotton and products	476	$76,690	Logs	2,750	$6,000
Rice	7,641	305,340	Fuel oil	17,457	116,402
Lumber	300	3,000	Fertilizers	255	5,000
Live stock	456	42,300	Coal	145	885
Hides and furs	155	36,000	Brick	54	280
Molasses	1,275	40,500	Machinery	16	3,600
Potatoes	75	2,400	Sugar	33	3,500
Oranges	100	6,000	Potatoes	285	6,450
Shingles and laths	180	2,600	Feed, ground	296	5,920
Rosin oil	87	3,374	Miscellaneous	1,004	100,400
Cord wood	48	174			
Poultry and eggs	6	1,050	Total receipts	22,295	248,437
Total shipments	10,799	519,428	Grand total	33,094	767,865

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be fairly accurately given as 1,320,000 ton-miles.

(*c*) *Bayou Plaquemine Brule.*—For history of this work, see current summary, page 518.

No field work was done during the year.

APPROPRIATION.

June 25, 1910	$5,000

S 11.

IMPROVEMENT OF HOMOCHITTO RIVER, MISSISSIPPI.

For history of this work, see current summary, page 520.

No field work was done during the year.

The expenditures made from this appropriation during the year were for a proportional part of the combined snag boat and dredge *Delatour* and for office expenses.

APPROPRIATIONS.

March 3, 1899	$16,000
June 13, 1902	2,000
March 3, 1905	2,000
March 2, 1907	4,000
	24,000

ABSTRACT OF CONTRACTS IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of contractor: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

For abstract, see report "Mouth and passes of Calcasieu River, Louisiana."

S 12.

IMPROVEMENT OF BAYOU LAFOURCHE, LOUISIANA.

For history of this work, see current summary, page 522.

No work was done during the year as the dam of the state levee boards, closing the head of the stream under authority of the act of June 13, 1902, is still in existence, and the bayou below the dam is in fairly good condition.

The limit of time for the removal of the dam, which, by the acts of April 13, 1904, and March 2, 1907, was extended to January 1, 1910, has expired, but as plans are now being prepared by the state levee boards for a lock at the head of the bayou, which it is believed will be adequate for commercial purposes and the estimated cost of which will make its construction possible by them, no action for the removal of the dam by the United States is deemed advisable at this time.

No expenditures were made during the year.

APPROPRIATIONS.

June 18, 1878	$10,000.00
March 3, 1879	10,000.00
June 14, 1880	5,000.00
July 5, 1884	5,000.00
August 11, 1888	50,000.00
September 19, 1890	50,000.00
July 13, 1892	50,000.00
August 18, 1894	40,000.00
June 3, 1896	25,000.00
March 3, 1899 (maintenance)	7,500.00
June 13, 1902 (maintenance)	7,500.00
June 25, 1910 (maintenance)	7,500.00
	267,500.00
June 30, 1909, amount carried to surplus fund	1,914.83
	265,585.17

COMMERCIAL STATISTICS, FROM JANUARY 1, 1909, TO DECEMBER 31, 1909.

Vessels entering and departing.

Class.	Number.	Trips.	Net registered tonnage.
Steamers	6	614	69,748
Barges	13	536	132,300
Total	19	1,150	202,048

Shipments and receipts by water.

Articles.	Tons.	Value.
SHIPMENTS.		
Sugar and molasses	13,699	$1,251,074
Cotton and products	140	4,480
Hides and furs	78	11,850
Poultry and eggs	12	1,416
Live stock	46	2,460
Potatoes and onions	9,632	96,320
Lumber	219	2,190
Oats	458	13,708
Rice	10	400
Junk	218	2,180
Miscellaneous	320	32,000
Total shipments	24,832	1,418,078
RECEIPTS.		
Oil	39,442	289,248
Fertilizers	15	495
RECEIPTS—continued.		
Lime	62	$562
Machinery	2,370	21,240
Brick	141	564
Coal	434	1,792
Rosin oil	20	630
Pitch	12	254
Tar	15	250
Feed, ground	72	2,160
Sugar bags	4	420
Acid	8	350
Sulphur	10	500
Cooperage	411	7,391
Miscellaneous	2,770	277,000
Total receipts	45,786	602,856
Grand total	70,618	2,020,934

Time did not permit the collection of accurate ton-mileage statistics, but from available data these may be fairly accurately given as 9,900,000 ton-miles.

S 13.

REMOVING THE WATER HYACINTH, LOUISIANA AND TEXAS.

For history of this work, see current summary, page 523.

The U. S. boat *Hyacinth* operated in bayous Barataria, Segnette, Plaquemine, and Grosse Tete, spraying the plants and placing fixed booms at the mouth of three small tributaries of Bayou Barataria.

In the various spraying operations the *Hyacinth* used 148,149 gallons of spraying solution at a net cost per gallon in the tanks of 0.267 cent, and at a cost sprayed of 1.78 cents per gallon.

As 1 gallon is estimated as destroying 10 square yards of plants, the field operating cost per square yard was 0.178 cent.

Spraying operations were begun in May, 1910, on Spanish Lake, which drains into Bayou Teche, using an improvised equipment consisting of a barge with tanks and hand force pump, towed by a gasoline boat, the equipment being furnished by local interests, while the chemicals, labor, and superintendence were furnished by the United States. This work was still in progress June 30.

Spraying operations were also carried on during the latter months of the year in the headwaters of Bayou Vermilion, using an improvised equipment similar to that on Spanish Lake.

A system of patrol was also installed on the lower Vermilion, local labor being employed for the purpose of eradicating the plant if possible from the navigable portion of the stream.

The *Hyacinth* was laid up during the winter season, some alterations and repairs made, and an electric-light plant installed. There was expended on plant and field operations during the year the sum of $8,751.69.

A watchman was employed at the boom in Bayou Plaquemine from July 1 to November 6, 1909, and one was employed at an improvised boom at the Southern Pacific Railroad crossing on Bayou des Allemands from August 9, 1909, to January 10, 1910, and payments for their services aggregated $239.33 during the year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$20,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 3, 1899	$36,000.00
June 13, 1902 (allotted August 9, 1902)	18,000.00
September 26, 1902 (allotted September 26, 1902)	1,480.00
December 4, 1903 (allotted December 4, 1903)	500,00
April 28, 1904 (allotted June 4, 1904)	15,000.00
March 3, 1905	40,000.00
March 2, 1907 (allotted April 6, 1907)	10,000.00
	120,980.00
Receipts from sales (condemned property)	146.46
Reimbursement for damages to hyacinth boom	102.53
	121,228.99
November 4, 1907, allotted to Buffalo Bayou, Texas	500.00
	120,728.99
February 24, 1909, allotted from appropriation for emergencies in river and harbor works, act of March 2, 1907	5,000.00
March 3, 1909 (allotted March 26, 1909)	20,000.00
June 25, 1910	20,000.00
	165,728.99

S 14.

IMPROVEMENT OF BAYOU TERREBONNE, LOUISIANA.

For history of this work, see current summary, page 525.

No field work was done during the year.

EMERGENCIES IN RIVER AND HARBOR WORKS.

In October, 1909, a small dredge was leased which removed 5 piling, 126 large trees and a greater number of smaller ones that had been blown into the stream by the storm of September 20, 1909.

The U. S. hydraulic dredge *Ram* was borrowed from the fourth district of the Mississippi River Commission and on November 29, 1909, started to remove the mass of grass, cane, and earth which obstructed the waterway, but after encountering a mass of marsh grass, against which it was powerless, and further progress being impossible with this class of dredge, it was ordered back to New Orleans January 29, 1910.

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[a] Exclusive of the balance unexpended July 1, 1910.

An orange-peel dredge was then leased from the parish of Terrebonne and started work in Bayou Terrebonne about 20 miles below Houma, La., on April 25, 1910, and was still at work June 30, 1910.

APPROPRIATIONS.

June 14, 1880, to August 11, 1888 (as per H. Doc. 421, 57th Cong., 2d sess.)	$38,800.00
October 2, 1909 (allotment, act 1905)	1,000.00
November 9, 1909 (allotment, act 1905)	1,500.00
December 15, 1909 (allotment, act 1905)	7,500.00
June 25, 1910	25,000.00
	73,800.00
Payment reverting to the Treasury	158.90
	73,641.10

S 15.

IMPROVEMENT OF ATCHAFALAYA RIVER, LOUISIANA, FROM MORGAN CITY TO THE GULF OF MEXICO.

For history of this work, see current summary, page 527.

No field work was done during the year.

APPROPRIATION.

June 25, 1910	$540,000

S 16.

IMPROVEMENT OF LAKE PONTCHARTRAIN AND PASS MANCHAC, LOUISIANA.

For history of this work, see current summary, page 527.

No field work was done during the year.

APPROPRIATION.

June 25, 1910	$9,000

S 17.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION: INDEFINITE (REMOVAL OF SCHOONER A. J. RAMSAY FROM LAKE PONTCHARTRAIN, LOUISIANA).

This vessel was sunk in Lake Pontchartrain, Louisiana, in about 14 feet of water, midway between the mouth of Bayou St. John and the south draw of the New Orleans and Northeastern Railroad bridge over Lake Pontchartrain and directly on the course between these points.

Although its masts were above water, it was a dangerous obstruction to vessels navigating this portion of the lake.

The sunken vessel was about 60 feet long and 21 feet beam.

Contract for its removal was made February 18, 1910, for $450, and the vessel was broken up by explosives so that a depth existed over the wreck of the vessel equal to that in the lake adjacent to it.

The work was completed February 28, 1910, the sum of $450 being paid the contractor and $169.20 expended for inspection, engineering, and office expenses.

ABSTRACT OF CONTRACT IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1910.

Name and address of contractor: Charles Lange, New Orleans, La.

Work: Removing wreck of sunken schooner *A. J. Ramsay* from Lake Pontchartrain, Louisiana.

Contract price: $450.

Date of contract: February 18, 1910.

Emergency contract.

Date of commencement: February 19, 1910.

Time of completion: June 18, 1910.

APPENDIX T.

IMPROVEMENT OF RIVERS AND HARBORS IN THE GALVESTON, TEXAS, DISTRICT.

REPORT OF MAJ. G. P. HOWELL, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Galveston Harbor, Texas.
2. Galveston Channel, Texas.
3. Channel from Galveston Harbor to Texas City, Texas.
4. Channel to Port Bolivar, Texas.
5. Houston Ship Channel.
6. Operating and care of Morgans Canal, Texas.
7. West Galveston Bay Channel, Turtle Bayou, Trinity River, Anahuac Channel, Oyster Creek, Cedar, Chocolate and Bastrop bayous, Texas, including mouths of adjacent streams.
8. Inland Waterway, West Galveston Bay and Brazos River Canal, channel between Brazos River and Matagorda Bay, channel from Aransas Pass to Pass Cavallo, including Guadalupe River; Turtle Cove from Aransas Pass to Corpus Christi.
9. Operating and care of Galveston and Brazos Canal, Texas.
10. Mouth of Brazos River, Texas.
11. Channel from Pass Cavallo to Port Lavaca, Texas.
12. Aransas Pass, Texas.
13. Channel from Aransas Pass to Corpus Christi.
14. Construction of sea wall, etc., along the front of the Fort Crockett Reservation and from Thirty-ninth to Forty-fifth streets, Galveston, Texas.
15. Removing sunken vessel or craft obstructing or endangering navigation.
16. Operation of dredges.

UNITED STATES ENGINEER OFFICE,
GALVESTON, TEX., *July 20, 1910.*

SIR: I have the honor to forward herewith annual reports for the works of river and harbor improvements in my charge for the fiscal year ending June 30, 1910.

Very respectfully,

G. P. HOWELL,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

T 1.

IMPROVEMENT OF GALVESTON HARBOR, TEXAS.

OPERATIONS DURING THE YEAR.

JETTIES.

Work under the contract with Charles Clarke & Co., of Galveston, Tex., for the extension of the south jetty and repairs to the north jetty was completed October 29, 1909, the time of completion having been extended from March 24, 1909.

South jetty extension.—The contractor has delivered and placed between stations 353 and 357, 3,014.46 tons of riprap, at $3.64 per ton, amounting to $10,972.63, completing jetty to station 356. Total cost, including superintendence and inspection, surveys and office expenses, $12,013.41.

The extension of the jetty was begun in November, 1907, at station 348, and the completion of the contract extends the jetty to station 356, where the height of the mound above mean low water is 5 feet; beyond this an apron extends 300 feet to station 359. The work consisted of bringing jetty to a cross section, as follows: Height +5 feet, width of crest not over 20 feet, side slopes one on one and one-half. Mound was constructed of pieces less than 3 tons in weight, protected on crest and slopes to minus 15 feet with 10-ton pieces, and below minus 15 feet with pieces of not less than 3 tons and averaging 6 tons in weight. The apron was of "one man stone," i. e., from 20 pounds to 120 pounds each; its thickness is 4 feet.

South jetty repairs.—Under the above contract 1,738.03 tons of riprap in large and small pieces were placed in the jetty between stations 339 and 348 on minor repairs, at a cost of $3.64 per ton, amounting to $6,326.42. Total cost, including superintendence, inspection, and office expenses, $6,816.42.

These repairs consisted in filling openings along crest with blocks of stone weighing from 8 to 10 tons.

The storm of July 21, 1909, with a tide of about 10½ feet above mean low tide and wind of about 60 miles velocity, damaged the south jetty from station 0 to station 144, sweeping away trestle and track and displacing crest blocks, and in one or two places causing a settlement of about 3 or 4 feet. From about station 144 to station 300 little damage was done, but between station 300 and station 346 a number of crest blocks were washed down the slopes from the crest.

It has been estimated that to repair the south jetty from station 0 to station 144 will cost about $120,000, using concrete for capping.

From station 300 to station 346 the repairs have been estimated to cost approximately $60,000, including some slight repairs between station 346 and station 355.

North jetty repairs.—1,680.38 tons of riprap, at $3.64 per ton, amounting to $6,116.58, have been placed between station 219 and station 245. This completes repairs between station 80 and station 245. These repairs consisted of raising and replacing crest and top slope block, bedding them in small riprap. Total cost, including hire of plant, superintendence, inspection, surveys, and office expenses, $7,265.70.

Between station 0 and station 80 no repairs were made. This part of the jetty is in shoal water; no repairs to this section were considered necessary.

The July storm caused some slight damage to the jetty, principally at or near the outer end; to repair same it is estimated to cost about $25,000 to $100,000, depending on the method used.

OPERATIONS OF U. S. DREDGE GALVESTON.

The U. S. dredge *Galveston*, after being laid up for repairs and hauling out from July 4 to August 6, 1909, resumed work on the outer bar, and to end of fiscal year has removed 2,569,796 cubic yards of material at an operating cost of 5.168 cents and a total cost, including extraordinary repairs, surveys, superintendence, inspection, and office expenses, of 6.068 cents per cubic yard.

A consolidated report of the operations of same during the fiscal year will be found in Appendix T 16 of this report.

OPERATIONS OF U. S. DREDGE GEN. C. B. COMSTOCK.

The dredge *Gen. C. B. Comstock* was laid up between August 20, 1909, and November 30, 1909, for general overhauling and dry docking, at a cost of $20,784.75.

From July 1 to August 20, and December 1 to 20, 1909, the dredge removed 58,033 cubic yards from the inner bar and 345,785 cubic yards from the outer bar. A total of 403,818 cubic yards was removed at an operating cost of 4.428 cents and a total cost, including extraordinary repairs, surveys, superintendence, inspection, and office expenses, of 9.994 cents per cubic yard. A consolidated report of the operations of the dredge for the entire year will be found in Appendix T 16 of this report.

SURVEY.

Map of latest survey of the locality where the dredge *Galveston* has been at work is submitted herewith. It shows a least central depth of 33¾ feet, a 32-foot channel 600 feet wide, and a 30-foot channel 900 feet wide. A similar survey at the close of the preceding fiscal year showed a central depth of 30½ feet and a 30-foot channel 600 feet wide.

Soundings taken in the center of the channel from the Gulf to the upper limit of the improvement, crossing the old inner bar, show a least depth of 33¾ feet.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $155,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (taken from H. Doc. No. 421, 57th Cong., 2d sess.)	[a] $8,878,000.00
March 3, 1903	300,000.00
April 28, 1904	100,000.00
March 3, 1905	200,000.00
June 30, 1906	250,000.00
March 2, 1907	300,000.00
May 27, 1908	630,000.00
March 3, 1909 (allotted Mar. 27, 1909)	200,000.00
March 3, 1909 (allotted Mar. 25, 1910)	25,000.00
March 4, 1909	70,000.00
June 25, 1910	350,000.00
	11,303,000.00
Transferred to Galveston channel	50,000.00
	11,253,000.00

In addition to the above appropriations by Congress, the following additional amounts have been received:

Collected from steamer *Maratine*	$300.00
Collected from Quartermaster Department, United States Army	719.83
Transfer of tug *Anna*	10,000.00
Proceeds of sales of condemned property	1,741.13
Proceeds of sales of charts of Galveston Bay	202.65
Proceeds of sales of contact prints	12.64
Proceeds of sales of old boilers of dredge *Comstock*	1,200.00
Collected from rental of dredge *Galveston*	942.63
Proceeds from mess account	1.75
	11,268,120.63

CONTRACTS IN FORCE.

Contractor: Charles Clarke & Co., Galveston, Tex.

Amount and character of work: Repairing and extending jetties, 84,000 tons riprap for south jetty and 20,000 tons riprap for north jetty.

Rate: Riprap in place for extension of Galveston south jetty, $3,64 per ton. Riprap for repairing alongside of Galveston north jetty, at $3.09 per ton.

Date of approval: September 20, 1907.

Date of beginning work: November 23, 1907.

Date of expiration: March 24, 1909 (time limit waived).

Completed October 29, 1909.

COMMERCIAL STATISTICS.

All the commerce of Galveston channel, Bolivar channel, Texas City channel, and Houston ship channel which comes in or goes out into the Gulf, whether coastwise or foreign, passes through the jetty channel. For statistics, see pages 1634, 1635, 1636, 1637, 1638, 1641.

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[a] Total appropriation is given as $8,978,000; last item, $100,000, is for Galveston channel work and is accounted for under appropriations for that work.

T 2.

IMPROVEMENT OF GALVESTON CHANNEL, TEXAS.

OPERATIONS DURING THE YEAR.

At the beginning of the fiscal year the channel was from 25 to 35 feet deep and 900 feet wide from the Inner Red Beacon to Twenty-ninth street, except at the east end of the dike, on the north side, at the approach to the immigrant landing station, where the channel had been dredged to a width of 1,325 feet.

At the end of the year the channel had been dredged over 30 feet deep, 250 to 800 feet wide, from the Outer Red Beacon to Forty-sixth street. There is an available channel 25 feet deep 500 to 1,000 feet wide throughout the same distance. The depth ranges from 25 to 35 feet.

After undergoing repairs from July 1 to August 12, 1909, the U. S. dredge *Col. A. M. Miller* resumed work at station 8+520 and advanced to station 9+630, opposite Thirty-second street, removing 138,091 cubic yards of new material and 16,734 yards of refill. From September 1 to end of fiscal year the work has consisted of redredging the channel along front of wharves 525 feet wide, 30 to 35 feet deep, from station 0+6 to 6+0, and 375 feet wide to 13+600, removing a grand total of 1,309,955 cubic yards of sand and silt, at an operating cost of 6.777 cents per cubic yard, and a total cost, including extraordinary repairs, surveys, superintendence, inspection, and office expenses, of 8.211 cents per cubic yard.

The U. S. seagoing dredge *Gen. C. B. Comstock* removed 858,962 cubic yards in maintaining and straightening the channel between Outer Red Beacon, the outer end of the channel, and pier 10, at an operating cost of 3.358 cents per cubic yard, and a total cost of 3.679 cents per cubic yard.

A consolidated report of the operations of the dredges *Col. A. M. Miller* and *Gen. C. B. Comstock* will be found in Appendix T 16 of this report.

The record of fill and scour is as follows:

	Cubic yards.
Fill in channel this year	435,800
Scour in channel this year	223,000
Net fill in channel this year	212,800
Total fill as per last report	2,325,200
Total fill to date	2,538,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $125,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

June 13, 1902	$100,000.00
March 3, 1903	200,000.00
April 28, 1904 (allotted November 30, 1904)	20,000.00
March 3, 1905	175,000.00
Amount diverted from Galveston Harbor	50,000.00
March 2, 1907	200,000.00
March 3, 1909	200,000.00
June 25, 1910	250,000.00
Total	1,195,000.00

In addition to the above appropriation by Congress, the following additional amounts have been received:

Proceeds of sale of condemned property	182.57
Receipts from sales of contact prints	1.80
Rental of dredge *Miller*	169.97
Total	1,195,354.34

COMMERCIAL STATISTICS.

[Calendar year ending December 31, 1909.]

Tonnage of vessels and revenue collected.

Class.	Entered.		Cleared.	
	Number.	Tonnage.	Number.	Tonnage.
Foreign-bound steamers	438	703,501	438	1,150,295
Coastwise steamers	320	766,912	323	759,548

Duties on imports collected for port of Galveston	$401,698.71
All money collected at custom-house for port of Galveston	469,797.55

Domestic exports.

[Calendar year ending December 31, 1909.]

Commodity.	Quantity.	Value.	Commodity.	Quantity.	Value.
	Tons.			*Tons.*	
Beef, canned, pickled	192	$38,001	Oil, oleo	5,483	$124,126
Boards, deals, and planks	26,572	391,830	Oil, lubricating	1,808	67,055
Bran	2,494	59,923	Pork, canned, pickled	39	5,918
Cotton	646,006	163,453,890	Rice	866	10,015
Cattle	66	13,415	Rice, bran	1,375	27,556
Corn	99,300	2,501,803	Rice, hulls	3,114	17,032
Eggs	183	24,634	Rice, polish	867	16,550
Flour	86,033	1,898,386	Sausage	163	32,485
Horses	255	25,225	Staves	5,207	230,107
Hogs	666	26,658	Tallow	978	90,063
Hair, camels' noils	26	7,740	Timber, sawn	7,192	83,809
Hams and bacon	386	71,780	Timber, hewn	1,403	2,632
Lard	10,941	2,204,247	Wheat	84,336	3,013,169
Lard, compound	3,030	493,532	Wool	17	8,656
Logs	65	197,637	All unenumerated articles	107,980	1,079,806
Mules	55	7,778			
Meal, cotton-seed	202,127	5,429,034	Total	1,274,370	182,406,762
Oil, cotton-seed	25,145	752,270			

Foreign imports.

[Calendar year ending December 31, 1909.]

Commodity.	Quantity.	Value.
	Tons.	
Bagging, burlaps, bags	3,391	$201,586
Bananas	4,206	26,780
Beans	796	39,590
Beer	7	1,817
Bone dust	93	2,869
Butts	10,319	213,218
Cotton products	2	2,842
Coffee	495	108,499
Creosote	48,664	742,063
Coal	465	1,258
Cement	1,294	7,432
Earthenware, enamelware, etc	1,196	159,446
Flour, rice	635	21,934
Fish	57	7,700
Fruits, dried, green, etc	131	7,631
Glassware, etc	30	14,845
Gutta percha	5	9,699
Hops	25	18,905
Hats	5	37,784
Hides	14	4,956
Iron, manufactures	225	13,466
Lumber, manufactures of wood	22	21,584
Liquors	183	71,038
Laces	8	$15,146
Metal, manufactures	13	6,342
Machinery	13	6,443
Nuts	49	6,343
Oil, olive	24	8,999
Oil, cocoanut	50	8,716
Oil, tar	298	8,926
Paper, manufactures	11	20,560
Pepper	12	1,484
Rice	3,761	134,808
Sardines	107	26,637
Seeds	1,402	194,793
Salt	2,043	7,726
Sisal, ixtle	622	59,221
Sulphur	243	11,945
Tea	16	6,756
Toys	166	110,683
Waste	936	54,262
General merchandise	31,261	312,611
Imports transported to other ports	77,444	774,447
Imports transported to Mexico	61,148	611,480
Total	251,887	4,125,330

Partial statistics of coastwise trade as furnished by various parties.

Commodities.	Tons.	Approximate value.
OUTBOUND.		
Bags	4	$480.00
Bricks	1	18.00
Cement	90	810.00
Cotton	126,955	28,513,897.00
Coal	3	36.00
Dress goods and clothing	1,365	819,000.00
Eggs	76	15,200.00
Fish	1	30.00
Flour	1,579	205,150.00
General merchandise	82,466	8,246,600.00
Hides	3,167	633,400.00
Ixtle	5,199	259,950.00
Lard	1,355	108,400.00
Lumber	7,405	74,050.00
Metals	25,013	2,501,300.00
Ore and copper	183,873	29,419,680.00
Oil	9	63.00
Onions	7,124	569,920.00
Packing-house products	70	2,100.00
Paint	1	70.00
Pecans	213	63,900.00
Plaster of Paris	1	80.00
Rice	14,175	850,500.00
Shooks	12	120.00
Sugar	484	48,400.00
Syrup	10	715.00
Tar	8	200.00
Vinegar	2	144.00
OUTBOUND—continued.		
Wool	13,696	$4,108,800.00
Whisky	6	4,800.00
Zacatan	127	6,350.00
Total	474,490	76,454,163.00
INBOUND.		
Canned goods	16,198	1,619,800.00
Cement	24,411	208,019.00
Cotton	1,566	469,875.00
Cotton seed	404	16,160.00
Fuel oil	104,330	745,214.00
Hides	7	1,400.00
Lumber	5	75.00
Machinery	2,623	524,600.00
Manufactures of iron and steel	64,210	6,421,000.00
Merchandise	487,528	48,752,800.00
Oranges	2	200.00
Scrap iron	16	160.00
Sugar	18,056	1,805,600.00
Ties	9,683	53,256.50
Trees	2	30.00
Coal	48,144	226,000.00
Total	777,185	60,844,189.50

T 3.

IMPROVEMENT OF CHANNEL FROM GALVESTON HARBOR TO TEXAS CITY, TEXAS.

A contract was entered into August 28, 1909, and approved September 1, 1909, with the Bowers Southern Dredging Company, of Galveston, Tex., for the redredging of the channel to a depth of 25 feet and width of 100 feet at a price of $1.77 per linear foot.

Work was started September 22, 1909, and completed April 18, 1910, redredging channel between stations 0+0 and 34+000, a distance of 34,000 linear feet. One thousand six hundred and thirty-six feet having shoaled after dredging, this was gone over again, making the total distance redredged 35,636 linear feet at $1.77 per foot, $63,075.72. Total cost, including surveys, superintendence, inspection, and office expenses, $65,023.73.

The ruling depth as shown by survey of June 30, 1910, is 18.7 feet.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $50,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 3, 1899	$250,000.00
March 2, 1907	60,000.00
March 3, 1909	50,000.00
June 25, 1910	100,000.00
Total	460,000.00
Sales of contact prints	.95
Total	460,000.95

CONTRACTS IN FORCE.

Contractor: Bowers Southern Dredging Company, Galveston, Tex.
Amount and character of work: Dredging 34,000 linear feet of channel.
Rate: $1.77 per linear foot.
Date of approval: September 1, 1909.
Date of beginning work: October 6, 1909.
Date of expiration: March 6, 1910 (time limit waived).
Completed: April 18, 1910.

COMMERCIAL STATISTICS.

Number and tonnage of vessels.

Class.	Number.	Tonnage.
Foreign	69	70,139
Coastwise	139	163,569

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

[For the year ending December 31, 1909.]

Articles.	Tons.	Approximate value.
EXPORTS.		
Lumber	15,257	$347,185.00
Manufactures of steel and iron	5,545	475,011.00
Packing-house products	610	95,577.00
Cotton	5,248	989,428.00
Cooperage	349	37,155.00
Grain	644	27,780.00
Box shooks	179	5,105.00
Live stock	266	35,505.00
Hay and feed stuffs	757	22,061.00
Miscellaneous	1,531	251,068.00
Total exports	30,386	2,285,875.00
IMPORTS.		
Crude glycerine	49	5,130.00
Coffee	678	105,160.00
IMPORTS—continued.		
Fruit	135	1,260.00
Mexican straw hats	60	45,060.00
Sisal	7,175	618,700.00
Rice	42	3,488.00
Chilli pepper	15	800.00
Miscellaneous	259	8,971.00
Total imports	8,413	788,569.00
Total exports and imports	38,799	3,074,444.00
Domestic shipments (miscellaneous)	141,200	31,064,000.00
Grand total	179,999	34,138,444.00

T 4.

IMPROVEMENT OF CHANNEL TO PORT BOLIVAR, TEXAS.

OPERATIONS DURING THE YEAR.

Redredging of this channel by Contractor John Jacobson, of Texas City, Tex., was begun on August 20, 1909, and contract completed November 1, 1909.

Three hundred and thirty-six thousand nine hundred and eighty-two cubic yards of material were removed at 11.90 cents per cubic yard, and 36,387 cubic yards were removed at 5.95 cents per cubic yard, at a total cost of $42,890.95.

The channel was redredged for a distance of 4,275 feet, over 25 feet deep and 150 feet wide on the bottom, and the turning basin, 525 feet wide and 700 feet long, was redredged.

To April 1, 1910, the channel had shoaled to a depth of 20 feet and the U. S. dredge *Gen. C. B. Comstock* was placed on the work to remove the shoals, working in daytime only, and to May 14, 1910, had restored the channel to a least depth of 24¾ feet, having removed 89,046 cubic yards of silt, at a total cost of $3,209.80.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement [a] $25,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

March 2, 1907	$50,000
March 3, 1909	50,000
June 25, 1910	91,080
Total	191,080

CONTRACTS IN FORCE.

[Emergency contract.]

Contractor: John Jacobson, Texas City, Tex.
Character of work: Dredging.
Rate: 11.90 cents per cubic yard.
Date of beginning work: September 24, 1909.
Date of expiration: December 26, 1909.
Completed: November 1, 1909.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

[Furnished by the Gulf and Interstate Railway Company.]

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Bricks	1,095	$13,508	Mill products	9,253	$740,240
Cement	2,205	22,000	Pipe, wrought-iron	4,994	149,820
Cotton	5,334	1,066,800	Rails	779	21,732
Creosote	7,906	94,872	Rice	4,234	254,400
Granite	1,109	25,000	Ties	3,408	143,136
Hardware	1,266	75,960	All other commodities	14,160	283,200
Live stock	1,158	69,450			
Lumber	22,876	3,431,400	Total	81,891	6,444,318
Melons, fruits, and vegetables	2,114	52,800			

T 5.

IMPROVING HOUSTON SHIP CHANNEL, TEXAS.

OPERATIONS DURING THE YEAR.

Dredging operations were carried on during the fiscal year under contract with John Jacobson, of Texas City, Tex., and repairs were made to the dike in Galveston Bay by United States plant.

A total of 119,669 cubic yards of material was excavated during the year, all new work.

A total of 1,602 feet of sheet-pile dike was completed and 8,926 feet partially completed.

The work performed in the different sections was as follows:

DIVISION ONE (LOWER BAY).

No work has been done. Since dredging channel to 18½ feet depth in 1904 this section has silted 5,523,510 cubic yards to May 19, 1910, of which 1,470,890 cubic yards have been removed.

Since the last redredging in 1908 the silting has amounted to 1,568,836 cubic yards, the ruling depth on May 19, 1910, being 9 feet, which is only slightly greater than the average depth in the bay.

DIVISION ONE (UPPER BAY).

No dredging has been done. Since dredging of channel to 18½ feet depth in 1903–4 this section has silted to the extent of 4,345,730 cubic yards, of which 2,383,423 cubic yards has been removed. Since the last redredging in 1908 the silting has amounted to 1,639,883 cubic yards, with a ruling depth on May 19, 1910, of 10.7 feet.

A contract was entered into October 30, 1909, and approved November 24, 1909, with the American Creosote Works, of New Orleans, La., for creosoted piles and lumber treated with 24 pounds of creosote per cubic foot; for repairs to the dike on the east side of the channel constructed in 1902. Uncreosoted timber had formerly been used, and the storm of July, 1909, badly damaged it.

Repairs to the dike consisted in the construction of a sheet-pile bulkhead placed 100 feet to the eastward of the old line of pile and brush dike, extending from the angle in dike, station 29+220 to station 41+220, a distance of 12,000 feet. Piles 20 and 25 feet long were driven 8 feet apart, 6 inches by 8 inches by 18 feet wales bolted to the piles, and sheet piles 4 inches by 12 inches by 20 feet driven and spiked to wales, an outside wale then being bolted on.

Work began on March 1, 1910, with government plant, and to end of fiscal year 1,293 round piles and 4,457 sheet piles had been driven, the dike being completed to station 30+822, and partly completed to station 39+748, or 54.2 per cent of the 12,000 feet, at a cost of $40.893.68 for material, and $10,889.93 for labor, supplies for plant, surveys, superintendence, inspection, and office expenses.

DIVISION TWO (BAYOU) MORGANS POINT TO HARRISBURG.

In this division operations consisted of new work performed by the dredge *Washington* under contract with John Jacobson, of Texas City, Tex., in easing of bend at Mile 22½. The contract was dated December 22, 1908, and work was begun February 18, 1909, and completed August 5, 1909. A total of 98,861 cubic yards of material was removed during fiscal year at a cost of 13.45 cents per cubic yard, $13,296.80, and 20,808 cubic yards at a cost of 6.725 cents per cubic yard, $1,399.34, completing a channel through the easement 3,800 feet long, 100 feet wide on the bottom, and over 18½ feet deep. Total cost of the work, including surveys, superintendence, inspection, and office expenses, $15,665.23.

Since dredging from 1903 to 1909 the channel has shoaled to the extent of 982,341 cubic yards, of which 128,234 cubic yards have been removed. The ruling depth on May 18, 1910, was 14 feet.

DIVISION THREE (BAYOU), HARRISBURG TO TURNING BASIN.

No dredging has been done by the United States. The city of Houston has had two slips dredged out of the north side of the Turning Basin, each 150 feet wide and 500 feet long, 20 feet deep. Snags and trees were removed from banks of channel under contract with John Jacobson, of Texas City, Tex., at a cost of $75. Total cost of surveys and office expenses, $63.03.

Since dredging in 1906–1908 the channel has shoaled to the extent of 468,062 cubic yards, of which 201,366 cubic yards have been removed. The ruling depth on May 18, 1910, was 17 feet.

HOUSTON DIVISION (TURNING BASIN TO MAIN STREET, HOUSTON).

No dredging has been done by the United States. Under contract with John Jacobson, of Texas City, Tex., the snags, trees, and logs deposited on banks by the U. S. derrick barge *No. 1* were removed and burned, at a cost of $500. United States dump scows were repaired at a cost of $200.60.

The channel has shoaled during the year to the extent of 168,000 cubic yards. The ruling depth on May 18, 1910, was 6 feet.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $500,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

GALVESTON SHIP CHANNEL AND BUFFALO BAYOU.

March 3, 1899	$300,000.00
June 13, 1902	300,000.00
March 3, 1903	500,000.00
April 28, 1904	200,000.00
March 3, 1905	200,000.00
June 30, 1906	200,000.00
March 2, 1907	200,000.00
May 27, 1908	145,000.00
March 3, 1909	100,000.00
March 4, 1909	55,000.00
June 25, 1910	300,000.00
Total	2,500,000.00
In addition to the above appropriation by Congress the following additional amounts have been received:	
Proceeds of sales of condemned property	291.02
Receipts from sales of contact prints	37.22
Total	2,500,328.24

SHIP CHANNEL IN GALVESTON BAY, TEXAS.

Total of appropriations to December 31, 1902, taken from House Document No. 421, Fifty-seventh Congress, second session	$849,016.85

BUFFALO BAYOU, TEXAS.

Total of appropriations to December 31, 1902, taken from House Document No. 421, Fifty-seventh Congress, second session	$228,750.00

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACTS IN FORCE.

Contractor: John Jacobson.
Character of work: Dredging—650,000 cubic yards.
Rate: 13.45 cents per cubic yard.
Date of approval: December 22, 1908.
Date of beginning work: January 4, 1909.
Date of expiration: September 4, 1909.
Completed: August 5, 1909.

Contractor: American Creosote Works (Incorporated), New Orleans, La.

Amount and character of work: Creosoted piles and lumber; 32,000 linear feet round piles, creosoted 24 pounds per cubic foot; 1,000,000 feet, board measure, 4 by 12 inches by 20 feet lumber creosoted 24 pounds per cubic foot; 58,000 feet, board measure, 6 by 8 inches by 18 feet lumber creosoted 14 and 24 pounds per cubic foot.

Rate: Creosoted piles, 31 cents per linear foot; 4 by 12 inches by 20 feet lumber, $44.50 per thousand feet, board measure, 6 by 8 inches by 18 feet lumber creosoted 14 pounds per cubic foot, $36.50 per thousand feet, board measure; creosoted 24 pounds per cubic foot, $44.50 per thousand feet, board measure.

Date of approval: November 24, 1909.
Date of beginning work: December 24, 1909.
Date of expiration: June 24, 1910 (time limit waived).

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

[Furnished by the city wharf master, Houston, Tex.]

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Beer and ice	3,500	$175,000	Hardware and machinery	21,000	$2,100,000
Brick and tiling	14,000	77,000	Hay	900	9,000
Coal	3,100	24,800	Lumber and shingles	214,200	2,574,000
Cotton	99,050	26,753,000	Miscellaneous	2,500	125,000
Cord wood	17,000	85,000	Oil and gasoline	7,900	355,500
Fish and oysters	2,000	60,000	Rice	22,394	893,760
Fruits and vegetables	2,000	60,000	Sand	480,000	480,000
Furniture and pianos	960	480,000	Shell	285,000	427,500
Grain feed	18,400	368,000			
Groceries and provisions	21,000	1,050,000	Total	1,214,904	36,097,560

T 6.

OPERATING AND CARE OF MORGAN CANAL, TEXAS.

A custodian was stationed at the canal during the year to enforce the regulations governing the navigation of the canal and to care for United States property.

Condition of canal.—The wooden bulkheads are gradually deteriorating.

For improvement of waterway of which this canal is a part, see page 1638 of this report.

The amount expended during the fiscal year was as follows:

Custodian	$390

COMMERCIAL STATISTICS.

Number of vessels passing up and down through Morgan Canal during calendar year ending December 31, 1909.

[As reported by the custodian at the canal.]

Vessels engaged in carrying freight	1,785
Vessels in the employ of the United States or its contractors	58
Total	1,843

ABSTRACT OF ALLOTMENTS.

December 2, 1896	$240	July 8, 1904	$360
July 16, 1897	360	June 23, 1905	360
July 1, 1898	360	June 16, 1906	360
July 1, 1899	360	June 14, 1907	360
July 14, 1900	360	June 11, 1908	360
June 11, 1901	5,000	June 13, 1909	360
July 18, 1902	360		
June 24, 1903	360	Total	9,560

T 7.

IMPROVEMENT OF WEST GALVESTON BAY CHANNEL, TEXAS, AND THE MOUTHS OF ADJACENT STREAMS, INCLUDING TRINITY RIVER, ANAHUAC CHANNEL, CEDAR BAYOU, CHOCOLATE BAYOU, AND BASTROP BAYOU.

(A) CHANNEL ACROSS HANNA REEF (EAST BAY BAYOU).

OPERATIONS DURING THE YEAR.

The U. S. derrick barge *No. 1* continued dredging the channel across the shell reef, completing same on July 11, 1909.

A channel 962 feet long, 40 feet wide on the bottom, and 5 feet deep was dredged, completing the channel.

A total of 6,692 cubic yards of material was removed at an operating cost of 9.475 cents per cubic yard.

One beacon was erected at the north end of the pass to mark the channel.

Ruling depth on March 1, 1910, was 3.6 feet.

APPROPRIATIONS.

June 13, 1902 (allotted July 8, 1902)	$681.91
March 3, 1909 (allotted April 1, 1909)	1,794.11
June 25, 1910	2,000.00
Total	4,476.02

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

(B) DOUBLE BAYOU.

OPERATIONS DURING THE YEAR.

No work has been performed during the year.

Ruling depth on March 1, 1910, was 3.9 feet.

APPROPRIATIONS.

June 13, 1902 (allotted July 8, 1902)	$6,952.65
March 2, 1907 (allotted Mar. 18, 1907)	3,596.50
March 3, 1909 (allotted Apr. 1, 1909)	4,733.06
June 25, 1910	5,000.00
Total	20,282.21

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

(C) ANAHUAC CHANNEL.

OPERATIONS DURING THE YEAR.

The U. S. dredge *Capt. C. W. Howell* began work May 20, 1910, and to June 15, 1910, had redredged channel 7,300 feet long, 50 feet wide, and 7 feet deep, removing a total of 35,717 cubic yards of material, at an operating cost of 4.934 cents and a total cost of 5.356 cents per cubic yard. Total cost of the work, including surveys, superintendence, inspection, and office expenses, $1,913.29.

APPROPRIATIONS.

March 3, 1905 (allotted Apr. 11, 1905)	$6,100.00
March 2, 1907 (allotted Mar. 18, 1907)	6,000.00
March 3, 1909 (allotted Apr. 1, 1909)	3,548.79
June 25, 1910	5,000.00
Total	20,648.79

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31,1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Bricks	5	$20	Hogs	37	$2,000
Building material	50	500	Lumber and logs	28,318	283,180
Charcoal	167	5,224	Petroleum	1,540	10,000
Cotton	5	1,200	Rice	9,850	326,250
Cotton seed	20	300	Sand	135	60
Eggs	44	10,000	Truck	50	1,000
General merchandise	1,614	161,400	Wood	375	1,000
Hardware and farming machinery	226	16,600	Total	42,436	818,734

(D) MOUTH OF TRINITY RIVER.

OPERATIONS DURING THE YEAR.

The U. S. derrick barge *No. 1* worked from October 28, 1909, to November 13, 1909, in Browns Pass, redredging channel 600 feet long, 40 feet wide, and 4½ to 7 feet deep, removing 2,579 cubic yards of material, at a total cost of 24.39 cents per cubic yard.

The U. S. dredge *Capt. C. W. Howell* began work at Browns Pass June 16, 1910, and to June 28, 1910, had redredged a channel 1,350 feet long, 80 feet wide, and 7 feet deep, removing 8,400 cubic yards of material, at an operating cost of 30.23 cents and a total cost of 30.66 cents per cubic yard.

On June 30, 1910, the ruling depth was 7 feet.

During April, 1910, freshets in the Trinity River brought down logs and driftwood, which caused a jam to form at Browns Pass. The U. S. snagboat *Guadalupe* worked four days in April and three days in May, 1910, removing logs and snags, opening channel to navigation at a total cost of $319.38.

APPROPRIATIONS.

August 30, 1852	$3,000.00	March 3, 1905 (allotted Apr. 1, 1905)	$3,800.00
June 18, 1878	10,000.00	March 2, 1907 (allotted Mar. 18, 1907)	658.03
March 3, 1879	2,500.00	March 3, 1909 (allotted Apr. 1, 1909)	3,590.39
June 14, 1880	4,000.00	June 25, 1910	1,500.00
March 3, 1881	10,000.00		89,611.39
August 2, 1882	8,000.00	Sale of condemned property	15.18
August 11, 1888	12,500.00	Total	89,626.57
September 19, 1890	10,000.00		
July 13, 1892	10,000.00		
August 18, 1894	5,000.00		
June 3, 1896	5,000.00		
June 13, 1902 (allotted July 8, 1902)	62.97		

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Bricks	5	$20	Hogs	37	$2,000
Building material	50	500	Lumber and logs	28,318	283,180
Charcoal	152	2,224	Petroleum	1,540	10,000
Cotton	5	1,200	Rice	3,500	150,000
Cotton seed	20	300	Sand	135	60
Eggs	44	10,000	Truck	50	1,000
General merchandise	54	5,400	Wood	375	1,000
Hardware and farming machinery	26	2,600	Total	34,311	469,484

(E) TURTLE BAYOU.

There were no operations during the year, as this work was not added to the project until June 25, 1910, by the river and harbor act approved that date.

APPROPRIATION.

June 25, 1910 (allotment)	$10,000

(F) CEDAR BAYOU.

OPERATIONS DURING THE YEAR.

No dredging has been done. Extraordinary repairs were made to the U. S. dredge *Capt. C. W. Howell*, amounting to $3,657.14, and charged to this allotment.

Ruling depth on March 4, 1910, was 5 feet.

APPROPRIATIONS.

Total of appropriations to December 31, 1902, taken from House Document No. 421, Fifty-seventh Congress, second session	$37,150.00
March 3, 1905 (allotted Apr. 1, 1905)	2,100.00
March 2, 1907 (allotted Mar. 18, 1907)	4,785.52
March 3, 1909 (allotted Apr. 1, 1909)	4,781.47
June 25, 1910	2,500.00
Total	51,316.99

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Article.	Tons.	Value.
Bricks	3,600	$16,200

(G) CLEAR CREEK.

OPERATIONS DURING THE YEAR.

The U. S. derrick barge *No. 2* began work on September 11, 1909, and to November 13, 1909, removed a total of 1,275 snags and overhanging trees from the channel and banks between the Davis bridge and Friendswood bridge, clearing the creek for a distance of 7½ miles, at a total cost of $2,993.95.

An examination and survey was made and bench mark established at mouth of creek, at a total cost of $139.39.

The ruling depths across the bar in Galveston Bay at the mouth of Clear Creek at the end of the fiscal year is 5 feet. Ruling depth in channel across Clear Lake was 3 feet on March 5, 1910.

APPROPRIATIONS.

June 13, 1902 (allotted July 8, 1902)	$2.30
March 2, 1907 (allotted Mar. 18, 1907)	10,487.86
March 3, 1909 (allotted Apr. 1, 1909)	4,000.00
June 25, 1910	6,000.00
Total	20,490.16

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

(H) DICKINSON BAYOU.

OPERATIONS DURING THE YEAR.

No work has been performed during the year.

Ruling depth on March 8, 1910, was 4.3 feet.

APPROPRIATIONS.

March 2, 1907 (allotted Mar. 18, 1907)	$8.039.65
March 3, 1909 (allotted Apr. 1, 1909)	3,981.29
June 25, 1910	5,000.00
	17,020.94
Proceeds of sales of condemned property	89.46
Total	17,110.40

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Brick	10	$45	Oil	38	$250
Cabbage	50	500	Sand	67	50
Furniture	10	500	Shell	3,450	450
Hardware	15	150	Trees, evergreens, and nursery stock	50	500
Hay	50	1,000			
Hogs, chickens, and eggs	50	5,000			
Lumber	167	2,500	Total	3,957	10,945

(I) BASTROP BAYOU.

OPERATIONS DURING THE YEAR.

After undergoing general repairs the U. S. dredge *Capt. C. W. Howell* began work August 12, 1909, in Bastrop Bay, near Christmas Point, and dredged a channel 32,411 feet long, 45 feet wide, and 6 feet deep to 5-foot depth of water in Bastrop Bayou, removing 154,196 cubic yards at an operating cost of 4.107 cents and a total cost of 4.673 cents per cubic yard, completing the work September 13, 1909. Total cost, including surveys, superintendence, inspection, and office expenses, $7,205.94.

The ruling depth in channel, March 10, 1910, was 4.8 feet.

APPROPRIATIONS.

March 2, 1907 (allotted Mar. 18, 1907)	$9,920.22
March 3, 1909 (allotted Apr. 1, 1909)	7,810.07
June 25, 1910	1,000.00
Total	18,730.29

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

(J) CHOCOLATE BAYOU.

OPERATIONS DURING THE YEAR.

No dredging has been done during the year.

An examination and survey of the bayou was made and a bench mark established at its mouth, at a total cost of $301.14.

Ruling depth March 11, 1910, was 4 feet.

APPROPRIATIONS.

March 2, 1907 (allotted Mar. 18, 1907)	$6,512.22
March 3, 1909 (allotted Apr. 1, 1909)	760.82
Act of June 25, 1910	1,000.00
Total	8,273.04

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

(K) OYSTER CREEK.

There were no operations during the year.

This work was added to the project by the river and harbor act of June 25, 1910.

APPROPRIATION.

June 25, 1910 (allotment)	$10,000

DREDGE CAPT. C. W. HOWELL.

APPROPRIATION.

Act March 3, 1909 (allotted Apr. 1, 1909)	$15,000

DREDGE GEN. H. M. ROBERT.

APPROPRIATIONS.

Act March 3, 1899	$65,000.00
Act June 13, 1902	2,992.51
Total	67,992.51
Sales of condemned property	11.79
Total	68,004.30

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] 25,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

T 8.

IMPROVEMENT OF INLAND WATERWAY ON COAST OF TEXAS.

(A) WEST GALVESTON BAY AND BRAZOS RIVER CANAL.

OPERATIONS DURING THE YEAR.

Under contract with Bowers Southern Dredging Company, of Galveston, Tex., dated September 7, 1909, a total of 128,321 cubic yards of material have been excavated to the prescribed cross section at contract price of 14¼ cents per cubic yard, amounting to $18,285.73, and 79,643 cubic yards, 1 foot below prescribed cross section at 7⅛ cents per cubic yard, amounting to $5,674.57, making an available channel 50,500 feet long, 40 feet wide, and 5 feet deep, between mile 1¾ and mile 11¼ in West Galveston Bay. Total cost, including surveys, superintendence, inspection, and office expenses, $25,666.57.

The U. S. dredge *Capt. C. W. Howell* started work September 13, 1909, redredging West Galveston Bay and Brazos River Canal at east end of the Mud Island Cut, mile 21, and advanced to mile 32½, a distance of 11½ miles, restoring channel to a depth of 5 feet and width of 40 feet, removing 157,254 cubic yards of material. From April 20, 1910, to May 13, 1910, the dredge worked in West Galveston Bay on approach to Mud Island Cut, redredging channel to depth of 5 and 6 feet and 40 feet wide, a distance of 8,480 feet (miles 19½ to 21), removing 23,093 cubic yards of material. A total of 180,347 cubic yards of material being excavated at an operating cost of 10.548 cents per cubic yard and a total cost, including superintendence, inspection, and office expenses of 12.272 cents per cubic yard, $22,134.50.

The U. S. derrick barge *No. 1* removed 12 piling and 226 cubic yards of mud from the channel at the Santa Fe Railroad drawbridge, at a total cost of $920.40. A total of 81 large and 81 small snags were removed from the Brazos Canal between miles 23 and 36, and 13 permanent iron beacons were erected to mark the line of the channel through West Galveston Bay at total cost, including superintendence, inspection, and office expenses of $1,997.97.

APPROPRIATIONS.

WEST GALVESTON BAY AND BRAZOS RIVER CANAL.

March 2, 1907	$59,500.00
May 27, 1908	92,029.00
March 3, 1909 (allotted Mar. 27, 1909)	32,000.00
Total	183,529.00
Sales of contact prints	2.48
Sales of condemned property	.26
Collected from Postal Telegraph Cable Company	500.00
Sale of hull and machinery of dredge *Robert*	1,780.38
Total	185,812.12

CHANNEL IN WEST GALVESTON BAY.

Total of appropriations to December 31, 1902 (taken from H. Doc. No. 421, 57th Cong., 2d sess.)	$25,000.00
March 3, 1905 (allotted Apr. 1, 1905)	10,000.00
Total	35,000.00
Sales of condemned property	58.34
Sales of contact prints	1.35
Total	35,059.69

GALVESTON AND BRAZOS CANAL.

June 13, 1902 (allotted July 8, 1902)	$39,307.66
March 3, 1905 (allotted Apr. 1, 1905)	28,000.00
Total	67,307.66

CONTRACTS IN FORCE.

Contractor: Bowers Southern Dredging Company, Galveston, Tex.
Amount and character of work: Dredging—275,000 cubic yards.
Rate: Fourteen and one-quarter cents per cubic yard.
Date of approval: September 3, 1909.
Date of beginning work: November 5, 1909.
Date of expiration: June 7, 1910.
Completed: February 21, 1910.

COMMERCIAL STATISTICS.

Article.	Tons.	Estimated value.
Fuel oil	2,732	$21,156

From records kept by the Gulf, Colorado and Santa Fe Railroad Company of vessels passing through the draw of its bridge across West Galveston Bay during the calendar year 1909, 5,434 vessels used the waters of West Galveston Bay.

(B) CHANNEL BETWEEN BRAZOS RIVER AND MATAGORDA BAY.

OPERATIONS DURING THE YEAR.

The river and harbor act of June 25, 1910, appropriated $200,000 for this improvement.

No work was done during the fiscal year.

APPROPRIATIONS.

June 25, 1910	$200,000

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

(C) CHANNEL FROM ARANSAS PASS TO PASS CAVALLO.

OPERATIONS DURING THE YEAR.

Dredging in this channel under the contract with the Bowers Southern Dredging Company, of Galveston, Tex., dated September 9, 1907, was completed on August 27, 1909.

During the fiscal year a total of 28,716 cubic yards of material was removed in redredging the shoal across Mezquit Bay, at a cost of 18.8 cents per cubic yard, amounting to $5,398.61. This section of the channel has shoaled to a depth of about 4 feet and was redredged to a depth of about 6 feet for a distance of 12,100 feet, between miles 32 and 34½. A sunken barge was removed, at a cost of $15. Eight permanent channel beacons have been erected along the line of the cut, at a cost of $933.49. Total cost of the work, including superintendence, inspection, and office expenses, $6,587.30.

An examination and survey of the channel was made in May and June, 1910, at a total cost of $92.62.

The channel has shoaled to the extent of about 103,000 cubic yards, and on May 31, 1910, the ruling depth was 4 feet.

APPROPRIATIONS.

March 2, 1907	$25,500.00
May 27, 1908	40,350.00
March 3, 1909 (allotted March 27, 1909)	40,000.00
	105,850.00
Sales of contact prints	.95
Total	105,850.95

CONTRACT IN FORCE.

Contractor: Bowers Southern Dredging Company, Galveston, Tex.
Amount and character of work: Dredging, 530,000 cubic yards.
Rate: 18.8 cents per cubic yard measured in place.
Date of approval: September 19, 1907.
Date of beginning work: January 22, 1908.
Date of expiration: April 6, 1909 (time limit waived).
Completed August 27, 1909.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Bricks	150	$675	Groceries, dry goods, and feed	140	$7,000
Nails	30	1,800			
Paint	30	4,200	Oysters and oyster shells	1,250	10,000
Cement	90	9,000	Fish	100	10,000
Lumber	1,350	13,500			
Lime	30	450	Total	3,240	63,625
Miscellaneous merchandise	70	7,000			

(D) GUADALUPE RIVER TO VICTORIA, TEX.

OPERATIONS DURING THE YEAR.

Dredging in this channel was continued under the contract with Bowers Southern Dredging Company, of Galveston, Tex., dated September 9, 1907, and during the fiscal year a total of 30,832 cubic yards of material was removed from the prescribed cross section at the contract price of 18.8 cents per cubic yard, amounting to $5,796.42, and 12,310 cubic yards of material from 1 foot below prescribed cross section, at 9.4 cents per cubic yard, amounting to $1,157.14, advancing a distance of 5,900 feet and completing the channel into the mouth of the Guadalupe River on July 28, 1909.

Three additional beacons were erected to mark the channel, at a total cost of $79.70 for labor.

The combined dredge and snag boat *Guadalupe* continued work of dredging and snagging in the river between Victoria and the mouth of the river. A total of 9,300 cubic yards of sand and gravel was removed, at an operating cost of 14.18 cents per cubic yard, and 834 large snags and 669 small snags were removed from the channel and 2,305 overhanging trees removed from the banks, at an operating cost of $2.272 each. Total cost of the work, including superintendence, inspection, office expenses, and laying up of dredge, $12,683.59. The *Guadalupe* was removed from the work on December 23, 1909, being replaced by the U. S. derrick barges *No. 1* and *No. 2*, which arrived on the work December 16, 1909. These derrick barges, with the assistance of teams on shore, have removed a total of 1,406 large and 2,133 small snags from the channel and 15,716 overhanging trees from the banks, at an operating cost of 85.087 cents each, and a total cost of 92.12 cents each. The channel has been cleared from Victoria, the upper limit of the improvement, to a point 12 miles below.

A total of 4,150 cubic yards of gravel and sand was dredged by U. S. derrick barge *No. 1* at an operating cost of 18.96 cents per cubic yard and a total cost of 20.61 cents per cubic yard. This work was done just below Victoria, to obtain a 40-foot channel 4 feet deep.

A detailed survey about 3 miles long has been made of shoals below Victoria, in order to lay out channel for dredging. The total cost of the work since the derrick barges have been on the river is $18,593.47.

APPROPRIATIONS.

March 2, 1907	$38, 829. 00
May 27, 1908	21, 871. 00
March 3, 1909	50, 000. 00
March 4, 1909 (alloted Mar. 27, 1909)	32, 000. 00
June 25, 1910	50, 000. 00
	192, 700. 00
Sales of contact prints	. 55
Total	192, 700. 55

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Corn	25	$8,030	Merchandise	360	$75,000
Cotton	200	60,000	Posts, cedar	200	900
Cotton seed	300	7,500	Wood	200	400
Cotton-seed meal	40	1,200	Wire	40	2,400
Implements	40	7,000			
Lumber	502	6,900	Total	1,907	169,330

(E) TURTLE COVE CHANNEL FROM TURTLE COVE TO CORPUS CHRISTI.

OPERATIONS DURING THE YEAR.

No work has been performed during the year.

An examination and survey was made during May, 1910, at a total cost of $106.92.

Since completion of dredging in April, 1909, the channel has shoaled to the extent of 25,000 cubic yards, practically all between miles 4 and 5 in Corpus Christi Bay.

The ruling depth on May 31, 1910, was 6 feet.

A contract was entered into June 22, 1910, with Bowers Southern Dredging Company of Galveston, Tex., to redredge the channel for a distance of 3,400 feet between stations 21+800 and 25+200 to a depth of 9½ feet and 75 feet wide, at $1.20 per linear foot, work to start July 10, 1910, and be completed within thirty days.

SURVEYS.

In compliance with the provisions of the river and harbor act of March 3, 1909, an examination and survey was made October 13 to November 22, 1909, with a view to obtaining a channel 25 feet deep and of the necessary width. Report on survey was made January 3, 1910, and published as House Document No. 678, Sixty-first Congress, second session.

APPROPRIATIONS.

March 2, 1907	$10,000.00
May 27, 1908	90,750.00
March 3, 1909	10,000.00
March 4, 1909 (allotted March 27, 1909)	23,000.00
	133,750.00
Sales of contact prints	13.40
	133,763.40

CONTRACTS IN FORCE.

[Emergency contract.]

Contractor: Bowers Southern Dredging Company, Galveston, Tex.
Amount and character of work: Redredging 3,400 linear feet of channel.
Rate: $1.20 per linear foot.
Date of approval: None. Emergency contract.
Date of beginning work: July 10, 1910.
Date of expiration: August 9, 1910.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Bags	4	$480	Rice	68	$4,080
Bricks	1	18	Scrap iron	16	160
Cement	90	810	Shooks	12	120
Coal	3	36	Sugar	484	484,000
Cotton	1,014	304,200	Sirup	10	715
Flour	2	140	Tar	8	200
General merchandise	2,907	290,700	Vinegar	2	140
Lumber	5	50	Whisky	6	4,800
Oil	9	63			
Packing-house products	300	2,100	Total	4,049	1,092,892
Plaster of Paris	1	80			

IMPROVING INLAND WATERWAY ON COAST OF TEXAS.

UNALLOTTED APPROPRIATION.

June 25, 1910	$50,000

T 9.

OPERATING AND CARE OF GALVESTON AND BRAZOS CANAL.

OPERATIONS DURING THE YEAR.

A boom tender was stationed at the entrance of the canal into the Brazos River to care for boom constructed at that point.

For improvement of the canal, see page 1648 of this report.

Amount expended during the fiscal year was as follows:

Boom tender	$130

ALLOTMENTS.

July 19, 1904	$1,030.00
October 30, 1905	759.23
June 16, 1906	420.00
April 23, 1907	1,500.00
June 21, 1907	420.00
June 24, 1909	38.44
June 23, 1910	120.00
Total	4,287.67

T 10.

IMPROVEMENT OF THE MOUTH OF BRAZOS RIVER, TEXAS.

OPERATIONS DURING THE YEAR.

On September 14 and 15, 1909, an examination of the jetties was made to ascertain the amount of damage caused by the storm of July 21, 1909, and approximate cost of repairs.

The jetties were not breached, but suffered the loss of many cap blocks, due to heavy sea and drift.

To place the jetties in the same condition they were before the storm will cost approximately $100,000.

A survey of Big Bend of the Brazos River and vicinity was made, together with an estimate of improvement to prevent the threatened cut-off referred to in the last annual report. (Appendix T 11. Report of the Chief of Engineers for 1909, pp. 1511 and 1512.) One thousand one hundred and eighty-seven dollars and one cent was expended on the survey, the work being delayed by storm tides and heavy winds of August 27–28, 1909.

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (taken from H. Doc. No. 421, 57th Cong., 2d sess.)	$298,750.00
March 3, 1905	50,000.00
June 30, 1906	87,500.00
March 2, 1907	35,000.00
	471,250.00
Proceeds of sales of condemned property	8.82
Total	471,258.82

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

T 11.

IMPROVING CHANNEL FROM PASS CAVALLO TO PORT LAVACA, TEXAS.

OPERATIONS DURING THE YEAR.

No work has been performed during the year.

APPROPRIATIONS.

June 25, 1910	$10,000

COMMERCIAL STATISTICS.

No commercial statistics have been obtained.

T 12.

IMPROVEMENT OF ARANSAS PASS AND BAY, TEXAS.

OPERATIONS DURING THE YEAR.

A contract was entered into June 23, 1909, with David M. Picton & Co. for repairs to the north jetty and extension seaward of the south jetty and the construction of a groin 1,000 feet long at the inshore end of the south jetty. Work was begun on July 16, 1909, and completed June 27, 1910.

NORTH JETTY.

During the year repairs were made between stations 22+00 old (36+91 new) and 53+50 old (68+41 new), placing 31,289.20 tons of riprap, at $2.81 per ton, amounting to $87,922.67, in rebuilding jetty to elevation of 5 feet above mean low water. Repairs complete to station 53+50 old (68+41 new). Total cost, including hire of plant, superintendence, inspection, surveys, and office expenses, $96,852.26.

The old station numbers refer to the stations on the Haupt jetty; the new numbers refer to the zero (inshore end) of the present jetty.

SOUTH JETTY.

The trestle and track have been extended from station 38+64 to station 65+02, a distance of 2,638 feet, at $7.50 per linear foot, amounting to $19,785. A total of 88,163.70 tons of riprap, at $3.08 per ton, amounting to $271,544.20, and 8,969.20 tons of crest stone, at $4.09, amounting to $36,684.04, have been placed in the extension of jetty from station 31+53 to station 65+02, a distance of 3,349 feet. Jetty is completed to elevation of 5 feet above mean low water to station 56+35. Total cost, including superintendence and inspection, $333,692.91.

On account of the erosion caused by the storms of June 30, 1909, and August 27, 1909, at the north end of Mustang Island, and the danger of a channel being cut on the south side of the south jetty, a groin or spur 1,000 feet long and 8 feet above mean low water, extending to the sand hills, was built at the inshore end of the south jetty and at right angles to its axis. In the construction of this groin a track and trestle 1,413.8 feet long, including turnout, at $4.30 per linear foot, amounting to $6,079.34, was required, and a total of 6,410.05 tons of riprap, at $2.70 per ton, amounting to $17,307.14 was placed. Total cost, including extra labor, hire of plant, superintendence, and inspection, $25,530.89.

SURVEYS.

In compliance with the provisions of the river and harbor act of March 3, 1909, a preliminary examination and survey was made October 27 to November 12, 1909, with a view to obtaining a suitable depth and width for Aransas Pass Harbor. Report on survey was made December 31, 1909, and published as House Document No. 639, Sixty-first Congress, second session.

The map of latest survey is submitted herewith showing a channel with central depth of 18 feet through from the Gulf, except for a distance of 350 feet where the channel leaves the north jetty, where the depth is reduced to 17 feet. At the outer end of the north jetty this channel is too narrow to be used, being only 150 feet wide. The width of the 12-foot channel is 300 feet.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $25,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.	

APPROPRIATIONS.

Total of appropriations to December 31, 1902 (taken from H. Doc. No. 421, 57th Cong., 2d sess.)	$896,250.00
March 3, 1905	100,000.00
June 30, 1906	100,000.00
March 3, 1907	200,000.00
May 27, 1908	200,000.00
March 3, 1909	100,000.00
March 4, 1909	90,000.00
June 25, 1910	217,500.00
June 25, 1910	350,000.00
	2,253,750.00
Receipts from sales of contact prints	11.35
Receipts from sales of condemned property	1.00
Total	2,253,762.35

CONTRACT IN FORCE.

Contractor: David M. Picton & Co., Rockport, Tex.

Amount and character of work: Jetty work: For south jetty, Gulf extension, 82,500 tons riprap; 18,500 tons crest stone; 2,700 linear feet creosoted pile railway trestle and track completed. For north jetty repairs, 15,000 tons riprap; 1,000 tons cap blocks. For south jetty, across island, 5,700 tons riprap; 1,700 linear feet uncreosoted pile trestle and track completed.

Rate: For south jetty, Gulf extension: Riprap properly placed on the work, $3.08 per ton; crest stone properly placed on the work, $4.09 per ton; creosoted pile railway trestle and track complete, $7.50 per linear foot. For north jetty, repairs: Riprap alongside the jetty, $2.81 per ton; cap blocks alongside the jetty, $3.93 per ton. For south jetty, across island: Riprap properly placed on the work, $2.70 per ton; uncreosoted pile railway trestle and track complete, $4.30 per linear foot.

Date of approval: July 3, 1909.
Date of beginning work: September 7, 1909.
Date of expiration: October 9, 1910.
Completed: June 27, 1910.

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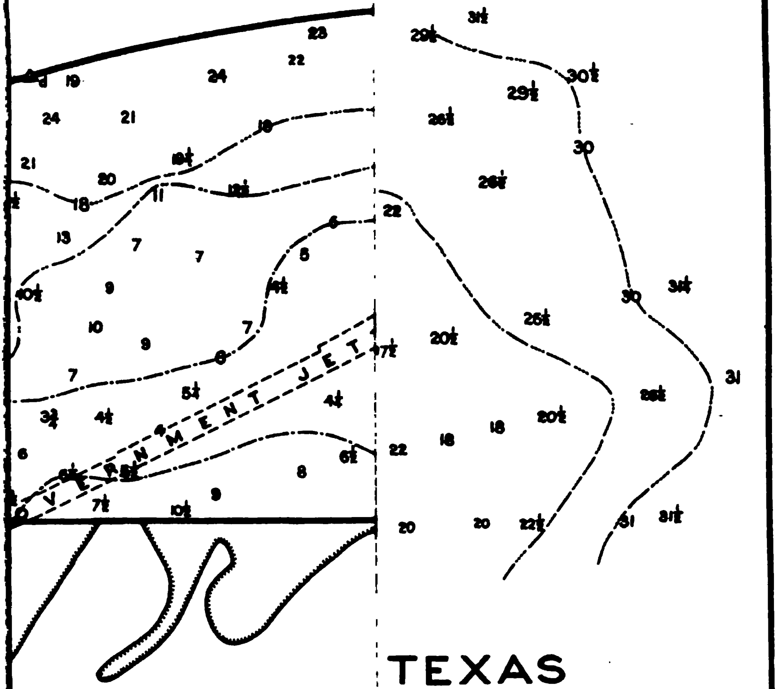
[a] Exclusive of the balance unexpended July 1, 1910.

EERS, U.S. ARMY



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To accompany report for GRS. U.S. ARMY

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COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Articles.	Tons.	Approximate value.	Articles.	Tons.	Approximate value.
Bags	4	$480	Rice	68	$4,080
Bricks	1	18	Scrap iron	16	160
Cement	90	810	Shooks	12	120
Coal	3	36	Sugar	484	484,000
Cotton	1,014	304,200	Sirup	10	715
Flour	2	140	Tar	8	200
General merchandise	2,907	290,700	Vinegar	2	140
Lumber	5	50	Whisky	6	4,800
Oil	9	63			
Packing-house products	300	2,100	Total	4,649	1,092,082
Plaster of Paris	1	80			

T 13.

IMPROVING CHANNEL FROM ARANSAS PASS TO CORPUS CHRISTI, TEXAS.

OPERATIONS DURING THE YEAR.

No work has been performed during the year.

APPROPRIATIONS.

June 25, 1910	$157,900

COMMERCIAL STATISTICS.

See report on Improving inland waterway on coast of Texas. (See (E) Turtle Cove Channel from Turtle Cove to Corpus Christi, p. 1652 of this report.)

T 14.

CONSTRUCTION OF SEA WALL, EMBANKMENT, AND FILL ALONG THE FRONT OF THE FORT CROCKETT RESERVATION, GALVESTON, TEXAS, AND CONSTRUCTING SEA WALL FROM THIRTY-NINTH STREET TO THE WEST LINE OF FORTY-FIFTH STREET, IN THE CITY OF GALVESTON.

OPERATIONS DURING THE YEAR.

Minor repairs to sea wall, fill, and retaining wall were made, amounting to $1,111.90.

A contract for constructing a concrete sidewalk, brick pavement, and concrete curbing, in rear of sea wall, was entered into October

6, 1909, approved October 20, 1909, with John C. Underwood, of Houston, Tex.; work to be commenced on or before November 25, 1909, and completed on or before March 25, 1910.

Time limit was waived and contract completed May 14, 1910.

The following quantities of material were placed: Four thousand nine hundred and thirty-nine square yards of concrete sidewalk, at $1.12 per square yard, amounting to $5,531.68; 12,297 square yards of brick pavement at 23 cents per square yard, amounting to $2,828.31; 8,892 linear feet of concrete curbing, at 43 cents per linear foot, amounting to $3,823.56; 156 linear feet of 6-inch vitrified sewer pipe, at 25 cents per linear foot, amounting to $39.

A supplemental agreement was entered into January 8, 1910, approved January 21, 1910, for using bituminous filler in the brick pavement instead of grout, the filler to be furnished by the United States. Twelve thousand two hundred and ninety-seven square yards brick pavement was so filled, at 4 cents per square yard, amounting to $491.88.

For the above work the United States furnished paving, brick, and filler as follows: Six hundred and nine thousand six hundred and ninety-seven paving brick, at $23 per 1,000, amounting to $14,023.03; 86.9 tons bituminous filler, at $23.40 per ton, amounting to $2,033.46.

The total cost for concrete sidewalk, brick pavement, concrete curbing, and sewer pipes, including superintendence, inspection, office expenses, extra labor, and material, amounted to $31,833.79.

APPROPRIATIONS.

April 28, 1904	$591, 046. 25
June 30, 1906	158, 953. 75
Total	750, 000. 00
Proceeds of sales of contact prints	1. 50
Total	750, 001. 50

CONTRACTS IN FORCE.

Contractor: John C. Underwood, Houston, Tex.

Amount and character of work: Constructing concrete sidewalk, brick pavement, and concrete curbing; 4,793 square yards concrete sidewalk in place; 12,611 square yards vitrified brick pavement in place; 9,200 linear feet concrete curbing in place; 160 linear feet 6-inch sewer pipe in place.

Rate: Concrete sidewalk, $1.12 per square yard; vitrified brick pavement, brick furnished by United States, 23 cents per square yard; bituminous filler between bricks in pavement, 4 cents per square yard; concrete curbing, 43 cents per linear foot; vitrified sewer pipe, 25 cents per linear foot.

Date of approval: October 20, 1909.

Date of expiration: March 25, 1910 (time limit waived).

Completed: May 14, 1910.

T 15.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

OPERATIONS DURING THE YEAR.

During the fiscal year the wreck of fumigating barge *Swearingen*, belonging to the State of Texas, in Galveston channel, was removed. The amount of expenditure for removing the wreck was as follows: Operating and maintaining U. S. derrick barge *No. 1* and services of diver, $999.96, and advertising sale of wreck, $14.82, or $1,014.78.

T 16.

OPERATION OF DREDGES.

DREDGING.

(A)

[By U. S. dredge *Galveston*.]

The dredge excavated, removed, and dumped from Galveston Harbor cubic yards of material as per following:

Detailed statement.

Location and character of material.	Amount dredged.		Cubic yards.		Total time pumping fiscal year.
	Number of loads.	Cubic yards.	Rate per minute pumping.	Rate per hour pumping.	*H. m.*
Outer bar: Sand, clay, and shell	1,315	2,569,796	11.7	701.42	3,663 38

	Cents.
Cost per cubic yard for operating only	5.168
Total cost per cubic yard for operating, repairs, etc	6.068

Distribution of effective working time.

	H.	*m.*
Pumping	3,663	38
Dumping	491	21
Going to and from dump	605	13
Going to and from wharf or from anchorage to cut	150	55
Total effective working time	4,911	07

Distribution of time lost while in commission.

	H.	*m.*
Taking fuel and water	202	35
Bad weather	429	45
Washing boilers and ordinary repairs	734	40
Sundays and holidays	1,331	00
Other causes	284	18
Extraordinary repairs	141	35
Total time lost while in commission	3,128	53

Distribution of time lost while out of commission.

	H.	m.
Extraordinary repairs and laid up	528	00
Other causes	192	00
Total time lost while out of commission	720	00
Total time accounted for	8,760	00

Money expended.

Wages	$32,344.92
Fuel for boiler (oil)	60,216.04
Fuel for galley	355.25
Water	531.06
Supplies:	
Subsistence	9,417.52
Engine room	6,051.32
Other supplies	7,784.21
Ordinary repairs	6,009.76
Laundry, ice, miscellaneous expense, etc	721.50
Extraordinary repairs and alterations and additions to dredge	19,898.69
Office expenses, superintendence, etc	3,231.41
Tender	3,711.30
Fort Point depot expenses	5,671.75
Total expended	155,944.73

The dredge was laid up July 4 to August 6, 1909, for hauling out and general repairs.

Detailed statement of cost of operating U. S. dredge Galveston for the fiscal year 1910.

Fiscal year.	Cubic yards excavated.	Operating cost.	Total cost.	Per cubic yard.	
				Operating cost.	Total cost.
				Cents.	*Cents.*
1910	2,569,796	$132,814.63	$155,944.73	5.168	6.068

(B)

[By U. S. dredge *Gen. C. B. Comstock.*]

Detailed statement.

Location and character of material.	Amount dredged.		Cubic yards.		Total time pumping, fiscal year.
	Number of loads.	Cubic yards.	Rate per minute pumping.	Rate per hour pumping.	
					H. m.
Outer and inner bar: Sand, clay, and shell	678	403,818			
Galveston channel, sand, mud	1,491	858,962			
Channel to Port Bolivar, sand	164	89,046			
Total	2,333	1,351,816	8.3	497	2,719 45

	Cents.
Cost per cubic yard for operating only	3.686
Total cost per cubic yard for operating, repairs, etc	5.56

Distribution of effective working time.

	H.	m.
Pumping	2,719	45
Dumping	154	36
Going to and from dump	506	26
Going to and from wharf or from anchorage to cut	61	30
Total effective working time	3,442	17

Distribution of time lost while in commission.

	H.	m.
Taking fuel and water	111	20
Bad weather	108	22
Washing boilers and ordinary repairs	493	46
Extraordinary repairs	241	45
Sundays and holidays	1,025	00
Other causes—alterations and additions	152	20
Total time lost while in commission	2,132	33

Distribution of time lost while out of commission.

	H.	m.
Extraordinary repairs	2,465	10
Total time accounted for	8,040	00

MONEY EXPENDED.

Wages	$16,177.02
Fuel for boiler (oil)	16,569.20
Fuel for galley	212.80
Water	249.14
Supplies:	
Subsistence	4,577.70
Engine room	1,906.15
Other supplies	2,666.33
Ordinary repairs	2,037.01
Laundry, ice, miscellaneous expenses, etc	383.54
Tender	669.77
Fort Point depot expenses	4,377.05
Extraordinary repairs and alterations and additions to dredge	22,118.92
Office expenses, superintendence, etc	3,227.47
Total expended	75,172.10

Detailed statement of cost of operating U. S. dredge Gen. C. B. Comstock from 1896 to end of fiscal year 1910.

Fiscal year.	Cubic yards excavated.	Operating cost.	Total cost.	Per cubic yard.	
				Operating cost.	Total cost.
				Cents.	*Cents.*
1896	419,748	$26,947.82	$31,061.35	6.42	7.4
1897	806,646	43,218.31	58,143.02	5.35	7.21
1898	562,976	27,929.33	44,107.51	4.96	7.8
1899	500,702	31,129.86	44,712.08	6.22	8.9
1900	661,038	29,346.22	33,307.09	4.43	5.03
1901 [a]	442,822	33,093.44	60,366.97	7.47	13.65
1902 [b]	181,485	14,376.16	44,508.09	7.9	24.5
1903	613,067	31,367.36	34,522.76	5.1	5.6
1904	674.497	26,974.65	39,894.67	4.0	5.9
1905	1,091,640	37,661.25	51,663.76	3.4	4.7
1906	1,303,865	43,114.36	57,111.61	3.3	4.4
1907 [c]	1,104,407	47,297.01	77,253.94	4.28	7.0
1908 [d]	492,532	23,381.83	64,424.33	4.75	13.08
1909	1,824,760	67,299.76	74,210.96	3.79	4.07
1910	1,351,826	49,825.71	75,172.10	3.68	5.56
Total	12,032,021	532,863.07	790,460.24	4.43	5.57

[a] Includes $21,000 cost of floating dredge which stranded on Pelican flat during the hurricane of September 8, 1900.

[b] Extraordinary repairs occasioned by severe hurricane of September 8, 1900, $27,081.93 expended.

[c] Extraordinary repairs occasioned by continual service since 1902.

[d] Extraordinary repairs caused by installing new boilers. Eight months lost awaiting boilers and installing same.

From 1896 to 1905, inclusive, 10 per cent of cost of dredge was included each year in obtaining the figures in the last column.

No allowance since 1905 for depreciation has been made.

Dredge transferred May 25, 1910, to Wilmington (N. C.) district.

(c)

[By U. S. dredge *Col. A. M. Miller*.]

GALVESTON CHANNEL.

Total number of cubic yards excavated	1,309,955.00
Number of cubic yards dredged per hour	279.88
Number of cubic yards dredged per minute	4.67

Distribution of working time.

	H.	*m.*
Pumping	4,680	20
Handling pipe line	238	40
Handling swinging wires	160	15
Total	5,079	15

Distribution of time while in commission.

	H.	*m.*
Effective working time	5,079	15
Delays changing location of dredge	119	00
Delays taking fuel and water	000	00
Delays for bad weather	245	15
Delays washing boilers and ordinary repairs	491	20
Delays for extraordinary repairs	154	50
Delays for other causes	390	20
Sundays and holidays	1,248	00
Total time while in commission	7,728	00

Distribution of time while out of commission.

	H.	*m.*
Extraordinary repairs	1,032	00
Total time accounted for	8,760	00

Running expenses.

Pay rolls	$24,960.53
Fuel for boilers	28,685.43
Fuel for galley	257.26
Water	274.71
Supplies:	
Subsistence	7,780.95
Engine room	2,659.57
Other supplies	6,536.20
Renewals of or addition to outfit	4,805.24
Ordinary repairs	2,837.03
Laundry, miscellaneous expenses, etc	149.52
Tender	6,298.22
Fort Point depot expenses	3,538.81
Operating cost	88,783.47
Extraordinary repairs	12,851.91
Recovering pontons after storm	1,137.38
Office expenses, superintendence, surveys, etc	4,782.19
	18,771.48
Total cost of dredging	107,554.95

Cost of dredging.

Improvement.	Cubic yards removed.	Operating cost.	Operating cost per cubic yard.	Total cost.	Total cost per yard.
			Cents.		*Cents.*
Galveston channel (maintenance and new work)[a]	1,309,955	$88,783.47	6.78	$107,554.95	8.21

[a] Impossible to separate cost of new work and maintenance.

(D)

[By U. S. dredge *Capt. C. W. Howell.*]

Total number of cubic yards excavated	378,660.00
Number of cubic yards dredged per hour	157.44
Number of cubic yards dredged per minute	2.62

Distribution of working time.

	H.	*m.*
Pumping	2,404	55
Handling pipe line	16	20
Handling swinging wires	156	00
Total	2,577	15

Distribution of time while in commission.

	H.	*m.*
Effective working time	2,577	15
Changing location of dredge	254	35
Delays taking fuel and water	3	00
Delays for bad weather	29	25
Delays washing boilers and ordinary repairs	241	10
Other causes	527	45
Sundays and holidays	1,008	00
Time lost while only working ten hours per day	1,113	10
Total time in commission	5,754	20

Distribution of time while out of commission.

	H.	*m.*
Extraordinary repairs	485	40
Other causes	72	20
Dredge laid up	2,448	00
Total time while out of commission	3,005	90
Total time accounted for	8,760	00

Running expenses.

Pay rolls	$13,020.52
Fuel for boilers (oil)	7,163.62
Fuel for galley	140.88
Water	29.17
Supplies:	
Subsistence	3,168.78
Engine room	537.92
Other supplies	1,236.31
Renewals of or addition to outfit	714.95
Ordinary repairs	840.94
Laundry, miscellaneous expenses, etc	398.92

Tender	$3,102.63
Fort Point depot expenses	3,358.18
Operating cost	33,712.27
Extraordinary repairs	4,733.58
Alterations and additions	325.00
Office expenses, superintendence, surveys, etc	1,291.51
Miscellaneous charges incidental to laying up dredge	1,421.51
Total cost of dredging	41,483.87
Deduct for work done for United States life-saving station and W. A. Guyton & Co	3,997.71
Total	37,486.16

Cost of dredging.

Improvement.	Cubic yards removed.	Operating cost.	Operating cost per cubic yard.	Total cost.	Total cost per cubic yard.
			Cents.		*Cents.*
West Galveston Bay and Brazos River Canal (maintenance)	180,347	$19,079.18	10.55	$22,134.50	12.27
Bastrop Bayou (maintenance)	154,196	6,333.31	4.12	7,205.94	4.67
Anahuac channel	35,717	1,762.60	4.94	1,913.29	5.35
Mouth of Trinity River	8,400	2,539.47	30.23	2,575.29	30.66
Cedar Bayou (extraordinary repairs)				3,657.14	
Total	378,660	29,714.56	7.85	37,486.16	9.90

(E.)

[By U. S. dredge and snag boat *Guadalupe.*]

[Employed in improving Guadalupe River from the mouth to Victoria, Tex., and snagging at mouth of Trinity River, Texas.]

Total number of cubic yards removed	9,300
Operating cost	$1,318.43
Operating cost per yard ... cents	14.18
Total cost, including laying up and repairs	$1,810.09
Total cost per yard ... cents	19.46
Number of snags removed	3,808
Operating cost	$8,653.34
Operating cost per snag	$2.27
Total cost, including laying up and repairs	$10,873.50
Total cost per snag	$2.86
At mouth of Trinity River 58 snags were removed, at a total cost of	$319.38

Running expenses.

Pay rolls	$5,689.33
Fuel for boilers	690.73
Supplies:	
Subsistence	1,496.08
Engine room	152.01
Other supplies	1,526.34
Renewals of or addition to outfit	339.12
Ordinary repairs	56.50
Laundry, miscellaneous expenses, etc	16.35
Tender	324.69
Operating cost	10,291.15
Laying up and repairs	1,888.66
Office expenses, superintendence, surveys, etc	823.16
Total cost of dredging and snagging	13,002.97

(F)

[By U. S. derrick barge *No. 1.*]

Improvement.	Operating cost.	Total cost.
Hannas Reef, dredging and beacons	$634.05	$634.05
West Galveston Bay and Brazos River Canal, removing obstructions, snagging, and dredging	2,708.66	2,918.37
Galveston channel, recovering pontoons washed away in storm, hauling schooner Cuba into deep water after being stranded in storm	1,481.80	1,481.80
Removing wrecks, raising quarantine, fumigating barge Swearingen	966.63	1,014.78
Mouth of Trinity River, dredging	629.05	695.72
Galveston Ship Channel and Buffalo Bayou, division one, dike; extraordinary repairs and overhauling		3,855.74
Inland waterway along coast of Texas, Guadalupe River, snagging and dredging	8,780.89	9,491.74
Total	15,201.08	20,092.20

Running expenses.

Pay rolls	$7,973.65
Fuel for boilers	567.91
Fuel for galley	101.35
Water	7.49
Supplies:	
Subsistence	2,454.40
Engine room	112.22
Other supplies	1,550.00
Ordinary repairs	573.48
Laundry, miscellaneous expenses, etc	317.80
Tender	805.92
Port Point depot expenses	736.86
Operating cost	15,201.08
Extraordinary repairs	2,308.70
Alterations and additions	1,547.04
Office expenses, superintendence, surveys, etc	1,035.38
Total cost	20,092.20

(G)

[By U. S. derrick barge *No. 2.*]

Improvement.	Operating cost.	Total cost.
Clear Creek, snagging	$2,984.95	$2,993.95
Inland waterway along coast of Texas, Guadalupe River, snagging	8,389.45	9,101.73
Total	11,374.40	12,095.68

Running expenses.

Pay rolls	$7,102.53
Fuel for boilers	445.67
Fuel for galley	48.60
Supplies:	
Subsistence	1,387.70
Engine room	113.89
Other supplies	976.82
Ordinary repairs	218.21
Laundry, ice, miscellaneous expenses, etc	248.30
Tender	390.83
Fort Point depot expenses and fitting up barge	441.85
Operating cost	11,374.40
Office expenses, superintendence, etc	721.28
Total cost	12,095.68

APPENDIX U.

IMPROVEMENT OF RIVERS AND HARBORS IN THE DALLAS, TEXAS, DISTRICT.

REPORT OF CAPT. A. E. WALDRON, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Johnsons Bayou, Louisiana.
2. Mouths of Sabine and Neches rivers, Texas.
3. Operating and care of Port Arthur Canal, Texas.
4. Harbor at Sabine Pass, Texas.
5. Brazos River, Texas, from Old Washington to Waco.
6. Brazos River, Texas, from Velasco to Old Washington.
7. Trinity River, Texas.
8. Operating and care of Lock and Dam No. 1, Trinity River, Texas.
9. Cypress Bayou, Texas and Louisiana.
10. Waterway between Jefferson, Texas, and Shreveport, Louisiana, by the construction of a dam at foot of Caddo Lake.
11. Red River, above Fulton, Arkansas.
12. Sulphur River, Texas and Arkansas.

United States Engineer Office,
Dallas, Tex., July 16, 1910.

Sir: I have the honor to forward herewith annual reports for the fiscal year ending June 30, 1910, upon the works of river and harbor improvement in the Dallas, Tex., district.

Very respectfully, your obedient servant,

A. E. Waldron,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

U 1.

IMPROVEMENT OF JOHNSONS BAYOU, LOUISIANA.

During the fiscal year the dredge *Port Arthur* was towed from the Port Arthur Canal to the mouth of Johnsons Bayou, and began dredging cut across the bar May 3, completing same May 31, 1910, dredging a channel 2,100 feet long, 90 feet wide, and with an average depth of 6½ feet at mean low Gulf level. A beacon was erected near the outer end of cut to mark its location.

It is believed that this channel should be kept open, as the country served by Johnsons Bayou is exceedingly fertile, and would grow rapidly if continued depth of water was assured.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Appropriated prior to December 31, 1902 (as published in H. Doc. No. 421, 57th Cong., 2d sess., p. 257) (previous project)	$2,500.00
By act of Congress approved March 2, 1907 (present project)	2,500.00
Total	5,000.00
Reverted to Treasury	238.65
Net total	4,761.35

CONTRACTS IN FORCE.

There were no contracts in force on this work during the fiscal year.

COMMERCIAL STATISTICS.

Vessel classification.

JOHNSONS BAYOU, LOUISIANA.

Class.	American.	Net registered tonnage.
Registered:		
Sailing	5	1,100
Gasoline	6	1,040
Unregistered, barges	5	1,600
Total	16	3,740

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
SHIPMENTS.			
Cotton	552 bales	138	$29,360
Cotton seed	282 tons	282	5,640
Live stock	10,000 head	1,250	125,000
Produce	400 tons	400	7,500
Hides and furs	40,000 pounds	20	6,000
Miscellaneous	10,000 pounds	5	450
Total		3,095	174,950
RECEIPTS.			
Cotton seed	800,000 pounds	400	24,000
Merchandise	420,000 pounds	210	15,750
Lumber	159,000 feet b. m	318	3,180
Cord wood	150 cords	150	600
Machinery, etc	30,000 pounds	15	1,500
Total		1,093	45,030
Grand total		4,188	219,980

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[a] Exclusive of the balance unexpended July 1, 1910.

U 2.

IMPROVEMENT OF THE MOUTHS OF THE SABINE AND NECHES RIVERS, TEXAS.

During the fiscal year $4,610.12 was expended dragging the channel for sunken obstructions and removing same, and in transferring a gasoline engine from the launch *Sextant* to the launch *Transit*, and installing a new gasoline engine in the *Sextant*.

The Sabine and Nechez rivers and the connecting canal are liable to develop quite a commerce, and for this reason the present improvement should be maintained.

ESTIMATE OF ADDITIONAL FUNDS REQUIRED.

No estimate of funds is submitted, the balance on hand being deemed sufficient for the present project.

APPROPRIATIONS.

Appropriated prior to December 31, 1902 (as published in H. Doc. No. 421, 57th Cong., 2d sess., p. 319)	$135,000.00
By act of Congress approved June 30, 1906	411,500.00
Total appropriated	546,500.00
Receipts from sales	3.60
Total	546,503.60

CONTRACTS IN FORCE.

There were no contracts in force on this work during the fiscal year.

COMMERCIAL STATISTICS.

SABINE RIVER, TEXAS AND LOUISIANA.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	5	2	7	4,074
Barges	13		13	27,584
Total	18	2	20	31,658

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Lumber	22,928,500 feet b. m.	45,857	$412,713
Sand and shell	34,000 cubic yards	38,000	57,000
Rice	16,144 sacks	1,453	58,120
Cattle	2,500 head	500	25,000
Cotton	40 bales	10	2,150
Cotton seed	5 tons	5	100
Saw logs	368,570 logs	258,000	645,000
Merchandise	600,000 pounds	300	18,000
Miscellaneous	200,000 pounds	100	5,000
Total		344,225	1,222,083

NECHES RIVER, TEXAS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered steamers	10	2	12	4,145
Unregistered barges	14	....	14	36,584
Total	24	2	26	40,729

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Sand and shell	46,300 cubic yards	52,000	$78,000
Lumber	3,087,500 feet b. m.	6,175	55,575
Fuel oil	235,100 barrels	37,034	185,170
Asphalt	2,285 barrels	400	6,000
Cord wood	1,500 cords	1,500	6,000
Spring water	100,000 gallons	400	1,400
Merchandise	766,000 pounds	383	15,320
Produce	200,000 pounds	100	4,000
Saw logs	83,700 logs	58,600	146,500
Machinery	500,000 pounds	250	12,500
Rice	1,500 sacks	135	5,400
Miscellaneous	600,000 pounds	300	6,000
Total		157,277	521,865

SABINE-NECHES CANAL, TEXAS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	11	2	13	5,863
Sailing	2	....	2	800
Barges	22	....	22	69,086
Total	35	2	37	75,749

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Lumber	24,000,000 feet, b. m.	48,000	$432,000
Sand and shell	16,000 cubic yards	18,000	27,000
Fuel oil	224,790 barrels	35,400	177,000
Asphalt	12,000 barrels	2,100	31,500
Fresh water	1,500,000 gallons	6,000	9,000
Merchandise	900,000 pounds	450	33,750
Live stock	250 head	50	3,000
Cord wood	500 cords	500	2,000
Rice	1,500 sacks	135	5,400
Produce	400,000 pounds	200	8,000
Machinery	380,000 pounds	190	11,400
Total		111,025	740,050

U 3.

OPERATING AND CARE OF PORT ARTHUR CANAL, TEXAS.

During the year the U. S. dredge *Port Arthur* worked from August 24, 1909, to April 30, 1910, and from June 1 to June 30, 1910, in dredging shoal places in the canal to a depth of 26 feet. In many places the thickness of material so removed was as much as 4 feet. The total linear feet of shoals dredged was 11,500.

The turning and lumber basins having shoaled considerably, and the dredge *Port Arthur* being in poor working condition, authority was granted by the Chief of Engineers to hire outside plant to do necessary dredging in these two basins. Contract was entered into on June 29, 1909, for dredging about 220,000 cubic yards therein, at a cost of 10½ cents per cubic yard, work to commence not later than August 1, 1909. A supplemental agreement to this contract was entered into on August 17, 1909, approved by the Chief of Engineers September 21, 1909, and by the Acting Secretary of War September 22, 1909. This supplemental agreement merely modified the text of the contract, and caused no change in price, time of completion, or amount of dredging. This contract was completed December 10, 1909, the total amount of material removed thereunder being 28,574 cubic yards for the lumber basin and 265,022.2 cubic yards for the turning basin, making a grand total of 293,596.2 cubic yards removed.

Summary of expenses for operating and care of Port Arthur Canal, Texas, for the fiscal year ending June 30, 1910.

Repairs to dredge	$8,181.59
Dredging and contingencies	14,512.31
Office and miscellaneous expenses and administration	1,405.64
Maintenance of lumber and turning basins by dredging (contract)	30,696.60
Total	54,796.14

Estimate of additional funds required.

Amount (estimated) for fiscal year ending June 30, 1911	$157,329.75
Balance from allotment for preceding year	6,203.86
Additional allotment required for fiscal year ending June 30, 1911	151,125.89

ALLOTMENTS.

Appropriation of July 5, 1884:	
Allotment of March 1, 1907	$30,000.00
Allotment of July 12, 1907	18,989.08
Allotment of July 23, 1908	22,353.81
Allotment of February 26, 1909	15,000.00
Appropriation of March 3, 1909:	
Allotment of May 6, 1909	15,000.00
Allotment of July 30, 1909	25,664.76
Total	127,007.65
Received from sales	1.25
Total	127,008.90

ABSTRACTS OF CONTRACTS IN FORCE.

Name and address of contractor: John Jacobson, Harrisburg, Tex.
Work: Dredging about 220,000 cubic yards in turning and lumber basins.
Prices per unit: Dredging, 10¼ cents per cubic yard.
Date of approval: Emergency contract, dated June 29, 1909.
Date of beginning work: August 1, 1909.
Date of expiration: October 1, 1909.
Completed.

COMMERCIAL STATISTICS.

PORT ARTHUR SHIP CANAL, TEXAS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	28	96	124	656,771
Sailing	8	6	14	16,118
Barges	15	....	15	169,079
Total	51	102	153	841,968

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Crude petroleum	1,753,540 barrels	276,148	$1,472,790
Partially refined petroleum	189,950,666 gallons	712,240	7,122,396
Refined petroleum	82,158,132 gallons	308,093	5,134,890
Lubricating oil	16,821,750 gallons	67,287	2,242,900
Asphalt	60,285 barrels	10,550	158,250
Cotton	168,676 bales	42,169	10,963,875
Cotton-seed products	17,565 tons	17,565	351,300
Lumber	68,900,000 feet b. m	129,800	973,440
Logs	2,038 logs	1,427	8,550
Oak staves	875,200 staves	5,252	131,287
Wheat	332,800 bushels	9,984	332,790
Corn	100,000 bushels	2,800	60,000
Rice	17,608,000 pounds	8,804	290,715
Sulphur	561 tons	561	11,220
Miscellaneous	548,000 pounds	274	16,420
Machinery, etc	3,000 tons	3,000	225,000
Tropical fruits	972 tons	972	20,000
Salt	871 tons	871	17,420
Total	....	1,597,797	29,533,243

U 4.

IMPROVEMENT OF HARBOR AT SABINE PASS, TEXAS.

Maintenance of jetty channel.—A new starboard shaft for the dredge *Sabine* arrived at Port Arthur July 8, 1909, and on July 13 the dredge was towed to Galveston, where she was hauled out on the marine ways July 17, 1909. On July 31, 1909, she returned to Sabine Pass, Texas, repairs having been completed.

From July 31, 1909, to January 31, 1910, the dredge removed and carried out to sea 1,176 loads of soft blue mud; estimated place material, 60 per cent of bin measurement, 221,576 cubic yards. During the month of January, 1910, experiments were made with the dredge *Sabine*, and it was found possible to increase the percentage of place material dredged to 90 per cent. From February 1 to June 30, 1910, the dredge removed and carried out to sea and dumped 737 loads; estimated place material, 90 per cent of bin measurement, 215,556.5 cubic yards. The cost of operation of the dredge *Sabine* during the year, including repairs and additions and cost of administration, was $26,765.45, making the cost per cubic yard dredged $0.0612.

The distribution of the dredge's time during the year is as follows:

	H.	m.
Working time	2,159	50
Lost time	1,169	05
Total	3,328	55

Distribution of working time.

	H.	m.
Underway	1,079	25
Pumping	925	10
Dumping	155	15
Total	2,159	50

Distribution of lost time.

	H.	m.
Taking on fuel oil	69	50
Rough sea and fog	432	35
Ordinary repairs	235	15
Extraordinary repairs	328	00
Washing out boilers	89	00
Miscellaneous	14	25
Total	1,169	05

The cost of the work during the year was distributed as follows:

Wages of crew	$9,719.93
Wages of subsistence department	560.00
Office expenses	639.50
Subsistence supplies	2,316.37
Fuel oil	6,472.07
Deck and engine-room supplies	1,013.16
Ordinary repairs	742.23
Extraordinary repairs	3,852.94
Miscellaneous supplies	1,449.25
Total cost of dredging	26,765.45

Repairs to jetties.—During the year the contractor for jetty work at Sabine Pass has performed the following work:

Granite blocks transfered from west jetty to east jetty	number	455
Riprap stone placed on west jetty	tons	9,150.07
Concrete placed on west jetty	cubic yards	710.41

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$300,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Appropriated prior to December 31, 1902 (as published in H. Doc. No. 421, 57th Cong., 2d sess., pp. 318–319)		$3, 632, 750. 00
Act of Congress—		
Approved March 3, 1905		150, 000. 00
Approved March 2, 1907		160, 000. 00
Approved May 27, 1908		190, 000. 00
Approved March 3, 1909 (allotted Apr. 9, 1909)		200, 000. 00
Approved March 4, 1909		10, 000. 00
Approved June 25, 1910		150, 000. 00
Total		4, 492, 750. 00
Reverted to Treasury from act of June 4, 1907	$16, 297. 03	
Reverted to Treasury from act of March 3, 1899	1, 194. 56	
		17, 491. 59
		4, 475, 258. 41
Receipts from sales, collections, etc		3, 337. 63
Total		4, 478, 596. 04

ABSTRACTS OF CONTRACTS IN FORCE.

Name of contractor: David M. Picton & Co., Galveston, Tex.

Character of work: Raising and repairing and the concrete capping of west jetty at Sabine Pass, Texas, and the transferring of granite blocks to east jetty at Sabine Pass, Texas.

Amount: $135,156.

Unit prices: Granite blocks, transferring at $4.97 per block; riprap stone, placed for $2.97 per ton; concrete, placed for $7.30 per cubic yard.

Date of approval: January 3, 1910.

Date of beginning: March 9, 1910.

Date of expiration: November 8, 1911.

COMMERCIAL STATISTICS.

SABINE PASS, TEXAS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	32	118	150	894,497
Sailing	10	9	19	22,086
Barges	17		17	204,501
Total	59	127	186	1,121,084

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Crude petroleum	3,582,619 barrels	564,192	$3,009,021
Partially refined petroleum	207,073,600 gallons	776.526	7,765.252
Refined petroleum	82,158,132 gallons	308,093	5,134,890
Lubricating oil	16,827,750 gallons	67,287	2,242,900
Asphalt	60,285 barrels	10,550	158,250
Cotton	168,676 bales	42,169	10,963,875
Cotton-seed products	17,565 tons	17,565	351.300
Lumber	77,258,500 feet b. m	154,517	1,158,810
Logs	2,038 logs	1,427	8,550
Staves, oak	875,200 staves	5,252	131,287
Wheat	332,800 bushels	9,984	332,790
Corn	100,000 bushels	2,800	60,000
Rice	17,608,000 pounds	8,808	290,715
Sulphur	211,503 tons	211,503	4,230,060
Miscellaneous	584,000 pounds	274	16,420
Machinery, etc	3,000 tons	3,000	225,000
Tropical fruit, etc	972 tons	972	20,000
Salt	871 tons	871	17,420
Total		2,785,786	36,116,540

U 5.

IMPROVEMENT OF BRAZOS RIVER FROM OLD WASHINGTON TO WACO.

The work during the year consisted of completing the abutment, and in driving foundation piles for the dam at lock and dam at Hidalgo Falls. Since April 1, 1910, work on this lock and dam has been suspended, pending the arrival of the iron and steel which it is necessary to have on hand before actual construction of the dam can be commenced.

Kind.	Unit.	Quantity.
Excavation	Cubic yards	54.100
Round piles	Number	873
Sheet piles	.....do	699
Concrete	Cubic yards	830
Filling	.....do	3,500
Paving	Square yards	1,417

During the year there was expended on this work of improvement, $72,498.73.

The project as it has apparently been adopted by Congress contemplates the construction of eight locks and dams, not in such relation to each other that a continuous slack-water navigation will be afforded, but in such manner that just so many separate navigable pools will be created, but divided from each other by a stretch of river unnavigable except at such times as the stream could be utilized by boats without the locks and dams. During the past year (which had been very dry) there would not have existed a 4-foot navigation on the open river part for a greater period than ten consecutive days. There were four periods in the year when the gauge at Waco read 5 feet or more. These were of ten days, eight days, seven days, and five days' duration.

As the best results and greatest benefits to the territory tributary to the river will be secured by having an uninterrupted navigable waterway from the upper end of the improvement to the coast, it is believed that the conditions should be laid before Congress in order that the fullest advantages possible under the project may be secured to the communities interested.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Act of Congress—	
Approved March 3, 1905	$75,000.00
Approved March 2, 1907	75,000.00
Approved May 27, 1908	100,000.00
Approved March 3, 1909 (allotted April 10, 1909)	75,000.00
Approved March 4, 1909	50,000.00
Approved June 25, 1910	75,000.00
Total	450,000.00
Receipts from sales, etc	57.68
Total	450,057.68

ABSTRACTS OF CONTRACTS IN FORCE.

Name of contractor: Grainger & Co. (Incorporated), Louisville, Ky.

Character of work: Furnishing and delivering iron and steel at Herrington, Tex.

Amount: $23,172.

Unit prices:

- All material shown on sheet B 100–29 of drawings, and listed in paragraph 26 (*a*) of specifications for the lump sum of $1,470.
- All material shown on sheet B 100–28 of drawings, and listed in paragraphs 26 (*b*) of specifications, for the lump sum of $3,965.50.
- All material shown on sheet B 100–26 of drawings, and listed in paragraph 26 (*c*) of specifications, for the lump sum of $1,672.50.
- All material shown on sheet B 100–31 of drawings, and listed in paragraph 26 (*d*) of specifications, for the lump sum of $1,066.
- All material shown on sheet B 100–22 of drawings, and listed in paragraph 26 (*e*) of specifications, for the lump sum of $10,800.
- All material shown on sheet B 100–24 of drawings, and listed in paragraph 26 (*f*) of specifications, for the lump sum of $550.
- All material shown on sheet B 100–23 of drawings, and listed in paragraph 26 (*g*) of specifications, for the lump sum of $400.
- All material shown on sheet B 100–35 of drawings, and listed in paragraph 26 (*h*) of specifications, for the lump sum of $185.
- All material shown on sheet B 100–34 of drawings, and listed in paragraph 26 (*i*) of specifications, for the lump sum of $2,800.
- All material not shown on any sheet of drawings, listed in paragraph 26 (*j*) of specifications, for the lump sum of $263.

Date of approval: April 5, 1910.

Date of beginning: May 3, 1910.

Date of expiration: July 12, 1910. Extended for a reasonable period.

COMMERCIAL STATISTICS.

Owing to the fact that the improvement is just beginning, no commerce has yet developed.

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[a] Exclusive of the balance unexpended July 1, 1910.

U 6.

IMPROVEMENT OF BRAZOS RIVER, TEXAS, FROM VELASCO TO OLD WASHINGTON.

Snagging operations were carried on between Velasco and Mile 110. Thirty-two miles of the river were worked over. There were 399 snags destroyed, 92 stumps destroyed, 5,980 shore snags cut, 704 logs removed from channel, 13,553 leaning trees cut, 21 leaning trees topped, and 2,455 linear feet of shoals were dredged.

Repairs to the snag boat *Navasota* were completed during the fiscal year.

There is reason to believe that a navigable depth can be maintained in the Brazos by open-channel work from its mouth to Mile 80, but above that point the expenditures would have to be so heavy that it is questionable whether such work could be considered preferable to the more certain method of improvement by locks and dams.

Commerce in the neighborhood of Velasco has increased considerably, but the people living along the river seem slow to avail themselves of its advantages. At the town of Brazoria the freight rate from Galveston is, by rail, 35 cents per hundred pounds. It has been reported that parties have offered to carry freight by water from Galveston to Brazoria, putting it on top of the bank, for 20 cents per hundred pounds, but that the Brazoria people still use the railroad, because when the railroad first went through their town they signed an agreement to pay 35 cents per hundred pounds until the railroad could afford to carry it for less.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $40,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Appropriated prior to December 31, 1902 (as published in H. Doc. No. 421, 57th Cong., 2d sess., p. 316)	$155,000.00
Act of Congress—	
Approved March 3, 1905	25,000.00
Approved March 2, 1907	75,000.00
Approved March 3, 1909, allotted April 2, 1909	25,000.00
Approved March 3, 1909, allotted to Galveston district April 9, 1909, transferred to Dallas district April 16, 1909, on account of snag boat *Captain C. W. Howell*	15,000.00
Approved June 25, 1910	45,000.00
Total	340,000.00
Received on account of sales	18.49
Total	340,018.49

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[a] Exclusive of the balance unexpended July 1, 1910.

ABSTRACTS OF CONTRACTS IN FORCE.

1.

Name and address of contractor: T. L. Smith, Columbia, Tex.
Work: Leasing one room in building situated in Columbia, Tex.
Contract price: $2.50 per month during life of agreement.
Date of approval: Lease, dated February 11, 1909.
Date of beginning: March 1, 1909.
Date of expiration: Lease to run for such term as may be necessary.

2.

Name of contractor: M. A. Sweeney Shipyard and Foundry Company, Jeffersonville, Ind.

Character of work: Furnishing and delivering complete stern-wheel snag boat *Waco*.

Amount: $28,490.

Date of approval: October 23, 1909.

Date of beginning: November 24, 1909.

Date of expiration: June 12, 1910. Extended for a reasonable period.

Supplemental agreement entered into April 13, 1910, approved by the Chief of Engineers May 14 and by Secretary of War May 16, 1910, adds $445 to the amount of contract.

COMMERCIAL STATISTICS.

BRAZOS RIVER, TEXAS, VELASCO TO OLD WASHINGTON.

Vessel classification.

Class.	American.	Passengers.
Unregistered:		
Steamers	1	92
Gasoline	1	
Sailing	3	
Total	5	92

Freight traffic.[a]

Article.	Amount, in short tons.	Valuation.
Cotton	7	$1,680
Cotton seed	20	500
Provisions	330	3,300
Hides and skins	2	600
Cord wood	2	2
Lumber	55	660
Grain	1,256	31,400
Piling	100	800
Live stock	6	600
Miscellaneous	30,880	308,800
Total	32,658	348,342

[a] A company building a gravel-dredging plant to operate in the river above Rosenberg transported 30,740 tons of miscellaneous freight up the river to location of their plant. Other than this all traffic was on the river in the vicinity of Velasco, Tex.

Lumber by flatboat	feet b. m.	5,000
Saw logs by raft	do	600,000

U 7.

IMPROVEMENT OF TRINITY RIVER, TEXAS.

LOCK AND DAM NO. 1 AND DAM AT PARSONS SLOUGH.

The work of constructing Lock and Dam No. 1 and dam at Parsons Slough was completed during the year, the items of work performed under the contract being as follows:

Classification.		Lock and Dam No. 1.	Dam at Parsons Slough.
Grubbing and clearing	acres	1.75	0.50
Excavation	cubic yards	24,007.00	3,848.00
Round timber	linear feet	1,829.00	....
Round piles	do	24,988.00	6,568.00
Brush	cords	2.00	....
Concrete in lock walls	cubic yards	4,740.176	....
Other concrete	do	2,218.00	....
Boulé gates	feet b. m.	3,879.00	....
Oak timber	do	86.00	....
Timber in permanent work	do	41,881.00	3,766.00
Timber in cribs	do	87,825.00	10,312.00
Riprap	cubic yards	1,573.00	443.00
Iron and steel	pounds	125,642.00	34,440.00
Steel reinforcing rods	do	54,260.00	4,567.00
Chain	do	4,570.00	683.00
Drift bolts	do	1,416.00	....
Sheet piling	feet b. m.	144,649.00	30,206.00
Sheet piling, steel	linear feet	1,129.00	....
Plain filling	cubic yards	3,950.00	....
Compacted filling	do	....	750.00
Riprap paving	square feet	7,850.00	....
Paving on spalls	do	1,300.00	....
Paving in concrete	do	....	3,536.00
Paving for cribs	do	388.00	....
Sand bags	each	9,762.00	126.00
Gages	linear feet	63.50	9.50
Crab, crane, and service car	pounds	2,350.00	....
Frames with rollers	each	252.00	....
Drains under lock floor	linear feet	565.00	....
Concrete	cubic yards	....	716.44
Crab	pounds	....	941.00

LOCK AND DAM NO. 2.

Very little work has been done by the contractor on this lock and dam during the fiscal year. The items accomplished were as follows:

Grubbing and clearing	acres	1.15
Round timber	linear feet	42.7
Timber in cribs	feet b. m.	26,529.5
Concrete	cubic yards	171.79
Steel reenforcing rods	pounds	7,098.1
Drift bolts	do	18.0
Excavation	cubic yards	11,999.9
Sheet piling	feet b. m.	8,063.28
Sand bags	number	1,255.0
Timber in cofferdam	feet b. m.	1,781.6
Iron and steel	pounds	6,407.07
Round piles	linear feet	30,276.3

LOCK AND DAM NO. 4.

Very little work has been accomplished by the contractor on this lock and dam during the fiscal year. The items accomplished were as follows:

Round piles	linear feet	24, 573. 00
Timber in cofferdam	feet b. m.	76, 079. 00
Excavation	cubic yards	18, 290. 00
Grubbing and clearing	acres	1. 75
Iron and steel	pounds	465. 00
Timber in cribs	feet b. m.	1, 750. 00

LOCK AND DAM NO. 6.

The contractor for the construction of Lock and Dam No. 6 worked under the contract from the commencement of the fiscal year until September 9, 1909, at the end of which day all construction work was suspended. For this reason the contract was annulled October 22, 1909. At the time of the annulment both the land and river walls were completed, with the exception of placing the gate anchors; the ladders on the river wall were yet to be placed in the recesses provided for them; the capstans and snubbing posts were in place; about 1,000 cubic yards of earth would have to be excavated before the construction of the lock floor could be commenced; the upper and lower land cribs were filled with riprap and stones cut for paving the same; the crib below the abutment was completed except the paving; the line of protection piles below the crib abutment had been placed, and 173 cubic yards of concrete had been placed in the abutment proper. About 250 piles had been driven of those required under the lock floor and dam.

A contract for the completion of lock and dam was entered into with another contractor and approved June 6, 1910, work to commence August 16, 1910.

LOCK AND DAM AT HURRICANE SHOALS.

The title to the land for the site of this lock and dam has been approved by the Attorney-General, subject to the removal of a few minor defects. Plans and specifications for the building of this lock and dam were forwarded to the Chief of Engineers May 7, 1910. A question has arisen as to the proper size of the lock chamber, and a Board of officers of the Corps of Engineers was appointed June 2, 1910, to consider the size locks that should be provided on the Trinity River, as well as the type and character of dams to be built in the future.

OTHER WORK.

The snag boat *Trinity* was operated from the commencement of the fiscal year until February 13, 1910, on which date she was sunk and pinned on a snag at about Mile 47½. Repairs to this snag boat have been authorized, and at the close of the year she is on the marine ways at Wallisville, Tex., undergoing repairs.

The steam launch *Frank P. Holland* was inspected and condemned and ordered destroyed during the year.

The two quarter boats under construction at the commencement of the year were completed and put in commission.

The following work was performed by the boats in commission:

Miles of the river worked over	95.7
Snags destroyed	20,150
Stumps destroyed	13,197
Shore snags cut	5,439
Logs removed from channel	9,686
Jams removed	349
Side jams removed	529
Leaning trees cut	17,751
Leaning trees topped	97
Trees girdled	9,064
Square yards of willow and brush cut	70,726
Wrecks removed	[a]1
Clay hogbacks shot out	5

The amounts expended during the fiscal year ending June 30, 1910, were as follows:

Constructing Locks and Dams Nos. 1, 2, and 6	$68,614.11
Constructing Lock and Dam No. 4 and Lock and Dam at Hurricane shoals	27,146.19
Funds contributed by citizens of Dallas	12,756.90
Maintenance	47,144.37
Total	155,661.57

The appropriations which have so far been made by Congress for the Trinity River would indicate that the intention has been to first provide locks and dams at the more troublesome and difficult places, relying temporarily upon open-river navigation between the pools. The low-water flow of the Trinity is so small, however, that this result is realized only during prolonged rainy periods. But navigation to be of value must either be constant or else such that its period of occurrence and duration can be foreseen. The latter condition is obtainable only on tidal waters and a few other localities, but can not be realized on the Trinity. To give the territory tributary to the river the benefits of its improvement requires therefore a constant navigation, which in turn is attained only by the construction of the locks and dams in consecutive order. This would in most rivers make it advisable to commence the improvement at tide water and carry it in order to the head of navigation. Any isolated construction involves the United States in costs for maintenance and operation, which is so much money wasted until that construction takes its place in the series of completed locks and dams. The Trinity River has a large commercial city and distributing center, Dallas, at the head of the proposed improvement. Below this on the river are large untouched forests of timber and extensive deposits of iron ore and lignite. The abundance and quality of these resources might make it practicable to place these materials on the market more quickly and to better advantage by carrying them upstream rather than down; in fact, the best markets will be at Dallas and places tributary to it. This condition may be regarded as justifying a departure from the method of procedure usually found most advantageous on all streams, of opening a continuous navigable channel from another or connecting waterway. Time of completion would be saved by working from both ends of the river, but wherever work is authorized it should be conducted in such manner as to afford a continuous channel from the point of beginning to the last completed construction.

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[a] Steamer *Alice*.

At present the prevailing freight rates are very high, but in one instance at least the Texas railroad commission has fixed a somewhat lower rate, as is seen by the following quoted circular:

[Circular No. 3291.—Amending Commodity Tariff No. 36.]

RAILROAD COMMISSION OF TEXAS,
Austin, Tex., January 11, 1910.

In approval of joint applications, submitted under No. 74 of the Trinity and Brazos Valley Railway Company and No. 834 of the International and Great Northern Railroad Company, it is hereby ordered that commodity tariff No. 36, issued by this commission to apply on cement, in carloads, transported by railroads between points in Texas and effective December 11, 1901, be amended by reestablishing exception No. 17 and by adding exception No. 20, as follows:

"17. Cement, car loads, minimum weight 60,000 pounds per car, from Harrys and Eagle Ford to Virginia Point and Galveston, via Dallas and T. & B. V. Ry., eight (8) cents per 100 pounds. Rates to or from intermediate points not to be affected. Effective January 1, 1910, and expiring August 31, 1910.

"20. Cement, car loads, minimum weight 60,000 pounds per car, from Harrys and Eagle Ford to Galveston and Virginia Point, via T. & P. Ry. and I. & G. N. R. R., eight (8) cents per 100 pounds. Rates to or from intermediate points not to be affected. Effective January 1, 1910, and expiring August 31, 1910."

This order will cancel Circular No. 3283, issued January 4, 1910.

ALLISON MAYFIELD, *Chairman.*
WILLIAM D. WILLIAMS,
Commissioners.

Attest:
E. R. MCLEAN, *Secretary.*

I hereby certify that the above is a true and correct copy of Circular No. 3291, this day adopted by the railroad commission of Texas.

Given under my hand and the seal of said commission, at the city of Austin, this the 11th day of January, 1910.

E. R. MCLEAN, *Secretary.*

The rate from Galveston to Dallas on cement is 25 cents per 100 pounds. The effect of the low rate to Galveston, put in force by the circular above quoted, has been to permit the use of Texas cement on the Galveston causeway, while the high rate in the opposite direction enforces the use of Texas cement in the government work in the vicinity of Dallas. If cement can be hauled to the seacoast for 8 cents per hundred, it should be possible to haul it away from the seacoast at as low a figure.

If the above quoted order is based on good and sound principles there is no reason why a similar order cannot be issued, making a general reduction of freight rates all over the Trinity Valley.

A reduction of 17 cents per 100 pounds would make it possible to buy cement in Dallas in the neighborhood of $1.50 per barrel, thus making a considerable saving in the cost of concrete.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$200,000
For maintenance of improvement	60,000
	[a] 260,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Appropriated for previous project (as published in H. Doc. No. 421, 57th Cong., 2d sess., p. 319)	$7,000.00
(Present project adopted June 13, 1902.)	
Act of Congress—	
Approved June 13, 1902	125,000.00
March 3, 1903	250,000.00
June 30, 1906	111,000.00
March 2, 1907	75,000.00
March 4, 1907	75,287.00
May 27, 1908	90,000.00
March 3, 1909 (allotted April 2, 1909)	75,000.00
March 4, 1909	125,000.00
June 25, 1910	184,000.00
June 25, 1910	85,000.00
Total	1,202,287.00
Received from citizens of Dallas, Tex	66,000.00
Received from sales	128.04
Total	1,268,415.04

ABSTRACTS OF CONTRACTS IN FORCE.

1.

Name of contractor: D. C. McCord.

Character of work: Construction of Lock and Dam No. 1 and dam at Parsons Slough.

Amount: $135,792.18.

Unit prices.

Classification.		Lock and Dam No. 1.	Dam at Parsons Slough.
Grubbing and clearing	acres	$15.30	$15.30
Excavation	cubic yards	.36	.37
Round timber	linear feet	.06	.06
Round piles	do	.19½	.25
Brush	cords	2.40	3.00
Concrete in lock walls	cubic yards	7.10	
Other concrete	do	7.10	
Boulé gates	M feet b. m	72.00	
Oak timber	feet b. m	.12	
Timber in permanent work	M feet b. m	84.00	90.00
Timber in cribs	do	54.00	60.00
Riprap	cubic yards	4.92	5.25
Iron and steel	pounds	.11	.10
Steel reenforcing rods	do	.07	.09
Chain	do	.13	.14
Drift bolts	do	.09	
Sheet piling	M feet b. m	60.00	65.00
Sheet piling, steel	linear feet	3.00	
Plain filling	cubic yards	.18	
Compacted filling	do	.48	.55
Riprap paving	square feet	.18	
Paving on spalls	do	.21½	.25
Paving in concrete	do	.32½	.36
Paving for cribs	do	.36	.32½
Sand bags	each	.12	.15
Gauges	linear feet	3.00	4.00
Crab, crane, and service car	pounds	.23	
Frames with rollers	each	10.80	
Drains under lock floor	linear feet	.60	
Concrete	cubic yards		8.00
Surface soil	do		1.00
Crab	pounds		.20

Date of approval: March 26, 1906.

Date of beginning: March 31, 1906.

Date of expiration: December 1, 1907. Extended for a reasonable period. Completed.

2.

Name of contractor: Hubbard Building and Realty Company.
Character of work: Construction of Lock and Dam No. 6.
Amount: $144,113.95.

Unit prices.

Classification.		Lock and Dam No. 6.
Grubbing and clearing	acres	$100.00
Excavation	cubic yards	.40
Round timber	linear feet	.30
Round piles	do	.50
Brush	cords	10.00
Concrete	cubic yards	7.50
Boulé gates	M feet b. m.	50.00
Oak timber	feet b. m.	.05
Timber in permanent work	M feet b. m.	50.00
Timber in cribs	do	50.00
Riprap	cubic yards	5.00
Iron and steel	pounds	.06½
Steel reenforcing rods	do	.07
Chain	do	.07½
Drift bolts	do	.05
Sheet piling	M feet b. m.	50.00
Sheet piling, steel	linear feet	.75
Plain filling	cubic yards	.30
Compacted filling	do	.40
Riprap paving	square feet	.40
Paving on spalls	do	.50
Paving in concrete	do	.50
Paving for cribs	do	.20
Sand bags	each	.10
Gauges	linear feet	.50
Crab, crane, and service car	pounds	.25
Frames with rollers	each	2.00
Drains under lock floor	linear feet	.50

Date of approval: July 28, 1906.
Date of beginning: October 10, 1906.
Date of expiration: September 1, 1908. Extended for a reasonable period. Annulled October 22, 1909.

3.

Name of contractor: J. G. White & Co. (Incorporated).
Character of work: Completion of Lock and Dam No. 6.
Amount: $85,000.

Unit prices.

Article and unit of quantity.		Lock and Dam No. 6.
Excavation	cubic yard	$0.75
Round timber	linear foot	.16
Round piles	do	.37
Brush	cord	9.98
Concrete	cubic yard	11.00
Boulé gates	M feet b. m.	80.00
Oak timber	foot b. m.	.15
Timber in permanent work	M feet b. m.	75.00
Timber in cribs	do	46.00
Riprap	cubic yard	5.75
Iron and steel	pound	.09
Steel reenforcing rods	do	.07
Chain	do	.06
Drift bolts	do	.09

Unit prices—Continued.

Article and unit of quantity.		Lock and Dam No. 6.
Sheet piling	M feet b. m.	$72.00
Sheet piling, steel	square foot	1.50
Plain filling	cubic yard	.30
Compacted filling	do	.50
Riprap paving	square foot	.27
Paving on spalls	do	.32
Paving in concrete	do	.35
Paving for cribs	do	.36½
Sand bags	each	.10
Gauges	linear foot	3.00
Crab, crane, and service car	pound	.25
Frames with rollers	each	5.00
Drains under lock floor	linear foot	.55

Date of approval: June 6, 1910.
Date of beginning: August 16, 1910.
Date of expiration: June 1, 1911.

4.

Name of contractor: Ball-Carden Company.
Character of work: Construction of Lock and Dam No. 2.
Amount: $125,482.36.

Unit prices.

Classification.		Lock and Dam No. 2.
Grubbing and clearing	acre	$290.00
Excavation	cubic yard	.40
Round timber	linear foot	.32
Round piles	do	.50
Brush	cord	10.00
Concrete	cubic yard	7.00
Boulé gates	M feet b. m.	50.00
Oak timber	feet b. m.	.10
Timber in permanent work	M feet b. m.	50.00
Timber in cribs	do	50.00
Riprap	cubic yard	4.69
Iron and steel	pound	.0624
Steel reenforcing rods	do	.0574
Chain	do	.0995
Drift bolts	do	.05
Sheet piling	M feet b. m.	50.75
Sheet piling, steel	square foot	1.75
Plain filling	cubic yard	.30
Compacted filling	do	.40
Riprap paving	square foot	.40
Paving on spalls	do	.40
Paving in concrete	do	.40
Paving for cribs	do	.25
Sand bags	each	.10
Gauges	linear foot	2.50
Crab, crane, and service car	pound	.25
Frames with rollers	each	7.00
Drains under lock floor	linear foot	.50
Timber in coffer dam	M feet b. m.	50.00

Date of approval: June 3, 1908.
Date of beginning: August 8, 1908.
Date of expiration: June 9, 1910. Extended for a reasonable period.

5.

Name of contractor: Ball-Carden Company.
Character of work: Construction of Lock and Dam No. 4.
Amount: $126,338.91.

Unit prices.

Classification.		Lock and Dam No. 4.
Grubbing and clearing	acre	$290.00
Excavation	cubic yard	.40
Round timber	linear foot	.32
Round piles	do	.50
Brush	cord	50.00
Concrete	cubic yard	7.00
Boulé gates	M feet b. m	50.00
Oak timber	feet b. m	.10
Timber in permanent work	M feet b. m	50.00
Timber in cribs	do	50.00
Riprap	cubic yard	4.69
Iron and steel	pound	.0624
Steel reenforcing rods	do	.0574
Chain	do	.0995
Drift bolts	do	.05
Sheet piling	M feet b. m	50.75
Sheet piling, steel	square foot	1.75
Plain filling	cubic yard	.30
Compacted filling	do	.40
Riprap paving	square foot	.40
Paving on spalls	do	.40
Paving in concrete	do	.40
Paving for cribs	do	.25
Sand bags	each	.10
Gauges	linear foot	2.50
Crab, crane, and service car	pound	.25
Frames with rollers	each	7.00
Drains under lock floor	linear foot	.50
Timber in cofferdam	M feet b. m	50.00

Date of approval: January 31, 1908.
Date of beginning: April 20, 1908.
Date of expiration: October 20, 1909. Extended for a reasonable period.

COMMERCIAL STATISTICS.

TRINITY RIVER, TEXAS.

Vessel classification.

Class.	American.	Passengers.
Unregistered:		
Steamers	3	5,428
Sailing	7	
Barges	2	
Total	12	5,428

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Cotton	812¼	$194,940
Cotton seed	1,025	25,625
Hides and skins	36	10,800
Live stock	16	1,600
Lumber	2,170	26,040
Spokes	1,001	12,012
Provisions	817½	8,175
Cord wood	1,075	1,075
Grain	852½	21,312
Charcoal	86	1,720
Coal	7½	37
Ice	508	4,064
Cement	1	6
Lime	2½	7
Brick	122½	490
Miscellaneous	675	6,750
Total	9,207¾	314,653

Lumber, by raft	feet b. m.	24,204,197
Lumber, by flatboat	do	54,600

All commerce on the Trinity River originated below Liberty, Tex.

U 8.

OPERATING AND CARE OF LOCK AND DAM NO. 1, TRINITY RIVER, TEXAS.

A lock master has been stationed at Lock and Dam No. 1 to take care of same. From time to time laborers have been hired to assist in passing drift whenever rises in the river necessitated their employment. During the fiscal year 1909 a defect was discovered in the lock. This defect was remedied during the fiscal year ending June 30, 1910. During the year it developed that the means at hand were not sufficient for rapidly throwing the dam in the face of sudden rises, and for this reason authority was obtained for the construction of a small maneuvering boat and the attaching of a small chain to each Boulé gate. This work was completed during the year.

With the exception of locking through two government boats, no lockage has been made on account of the unusable condition of the river below the lock, due to exceedingly low water.

Summary of expenses for operating and care of Lock and Dam No. 1, Trinity River, Texas, for the fiscal year ending June 30, 1910.

Operating lock and dam, labor and contingencies	$1,808.56
Installation of telephone line	37.00
Rent of telephone line and exchange service	96.47
Extraordinary repairs to lock	4,328.85
Administration and contingencies	167.89
Constructing maneuvering boat	984.45
Total	7,423.22

Estimate of additional funds required.

Amount (estimated) required for fiscal year ending June 30, 1911	$5,669.31
Balance remaining from allotment of preceding year, exclusive of outstanding liabilities and amount covered by uncompleted contract	1,426.78
Additional allotment required for fiscal year ending June 30, 1911	4,242.53

APPROPRIATIONS.

Act of Congress—	
Approved July 5, 1884 (allotted Mar. 3, 1909)	$2,000.00
Approved March 3, 1909 (allotted Apr. 30, 1909)	4,000.00
Approved March 3, 1909 (allotted July 30, 1909)	4,518.71
Approved March 3, 1909 (allotted Jan. 7, 1910)	1,850.00
Total	12,368.71

ABSTRACTS OF CONTRACTS IN FORCE.

1.

Name of contractor: The Southwestern Telegraph and Telephone Company.
Work: Leasing telephone equipment.
Contract price: $7 per month during life of agreement.
Date of approval: Lease, dated June 23, 1909.
Date of beginning: June 28, 1909.
Date of expiration: June 28, 1910, renewable at option of Government. Completed.

2.

Name of contractor: The Southwestern Telegraph and Telephone Company.
Work: Leasing telephone equipment.
Contract price: $7 per month during life of agreement.
Date of approval: Lease, dated June 28, 1910.
Date of beginning: June 28, 1910.
Date of expiration: Lease to run for such period as may be necessary.

COMMERCIAL STATISTICS.

On account of having the pool drained, not much navigation on the upper pool has had opportunity to develop, but at present considerable business is being done in the line of pleasure boating.

U 9.

IMPROVEMENT OF CYPRESS BAYOU, TEXAS AND LOUISIANA.

During the month of November, 1909, the quarter boat resumed work clearing the channel between Jefferson and Mooringsport, and work was continued until the end of the fiscal year.

The work done during the year was as follows:

Number of miles of the bayou worked over	39
Stumps destroyed	1,937
Shore snags cut	802
Logs removed from channel	1,279
Leaning trees cut	87
Leaning trees topped	51
Square yards of willows and brush cut	5,317
Markers placed to mark channel	172

If it were not for the prospect of a considerable development in the oil industry, there is no doubt that the cost of the improvement would amount to more than the total value of the commerce on Cypress Bayou. It is only by providing a through waterway to Shreveport that any reduction in freight rates can be expected.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Appropriated prior to December 31, 1902 (as published in H. Doc. No. 421, 57th Cong., 2d sess., p. 340)	$139,000.00
Allotted from appropriation for Red River (act of Aug. 11, 1888)	5,000.00
Allotted from appropriation for Red River (act of June 13, 1892)	1,701.33
Act of Congress—	
Approved March 2, 1907	10,000.00
Approved March 3, 1909 (allotted Apr. 2, 1909)	6,000.00
Approved June 25, 1910	5,000.00
Total	166,701.33

ABSTRACTS OF CONTRACTS IN FORCE.

No contracts were in force during the fiscal year.

COMMERCIAL STATISTICS.

CYPRESS BAYOU, TEXAS AND LOUISIANA.

Vessel classification.

Class.	American.
Unregistered:	
Gasoline	2
Barges	2
Total	4

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Railroad ties	60	$480
Live stock	42	4,200
Lumber	400	4,800
Oil-well supplies	1,435	287,000
Miscellaneous	175	1,750
Total	2,112	298,230

U 10.

IMPROVING WATERWAY BETWEEN JEFFERSON, TEXAS, AND SHREVEPORT, LOUISIANA, BY THE CONSTRUCTION OF A DAM AT THE FOOT OF CADDO LAKE.

The river and harbor act approved June 25, 1910, contained an item:

> Improving waterway between Jefferson, Texas, and Shreveport, Louisiana, by the construction of a dam to be so constructed as to admit of a lock when deemed necessary at the foot of Caddo Lake, in accordance with the report submitted in House Document Numbered Two hundred and twenty, Sixtieth Congress, first session, one hundred thousand dollars.

The dam constructed as authorized by this act will cut off all possible navigation to Shreveport, but as navigable periods are now short and infrequent and are not used, they are of no commercial importance, and no damage will be done by closing the route. It will be of benefit by preserving the water level, and consequently the navigable channel in Cypress Bayou and Caddo Lake between Jefferson, Tex., and Mooringsport, La.

It is only by providing a through waterway to Shreveport that any reduction in freight rates can be obtained.

U 11.

IMPROVEMENT OF RED RIVER ABOVE FULTON, ARKANSAS.

The snag boat *C. A. Culberson* and two quarter boats have been engaged during the fiscal year in removing obstructions from the river above Fulton, Ark.

The work accomplished by these boats during the year is as follows:

Number of miles of the river worked over	85⅜
Snags destroyed	10,290
Stumps destroyed	3,711
Shore snags cut	45,272
Logs removed from channel	2,496
Jams removed	32
Side jams removed	43
Leaning trees cut	54,528
Bar logs cut	4,754
Bank logs cut	473
Square yards of willows and brush cut	66,500

The estimate submitted is for carrying on snagging operations by means of the present plant.

There was expended during the year on work of improvement $42,677.15.

The past year has been very dry, but the inability of the snag boat *C. A. Culberson* to pass certain shoals seemed to indicate that navigation can not be provided for by simply removing the snags. Considerable open-river work will be necessary in addition. The size of the present plant is too small to accomplish any lasting results. In less than a year all indications of snagging work having been done at various places are obliterated by new obstructions lodging in the channel. Until a larger commerce develops on the Red River up to Fulton, there appears to be no good reason why snagging should be carried on above this point. But if carried on, it should be done with a much larger plant if the river is to be opened up to Denison, Tex.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $50,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Appropriated prior to December 31, 1902 (as published in H. Doc. No. 421, 57th Cong., 2d sess., p. 355)	$22,000.00
Allotted from appropriation of June 13, 1902, for the general improvement of Red River	10,000.00
Act of Congress—	
Approved March 3, 1905	100,000.00
Approved March 2, 1907	100,000.00
Approved March 3, 1909 (allotted Apr. 2, 1909)	40,000.00
Approved June 25, 1910	50,000.00
Total	322,000.00
February 23, 1901, received from sale of snag boat	1,500.00
Received from sale of blueprints	.50
Total	323,500.50

ABSTRACTS OF CONTRACTS IN FORCE.

No contracts were in force during the fiscal year.

COMMERCIAL STATISTICS.

RED RIVER, ABOVE FULTON, ARK.

Vessel classification.

One unregistered American steamer (*Ellen*).

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Provisions	4	$40
Grain	6	150
Staves and bolts	2,000	30,000
Miscellaneous	3	30
Total	2,013	30,220

By raft, 4,567,500 feet b. m. of saw logs.

U 12.

IMPROVEMENT OF SULPHUR RIVER, TEXAS AND ARKANSAS.

A quarter boat was at work during the year whenever the stage of water permitted, working over 73.6 miles of the river, and accomplishing the following results:

Snags destroyed	4,191
Stumps destroyed	782
Shore snags cut	1,039
Logs removed from channel	1,190
Side jams removed	6
Leaning trees cut	418
Leaning trees topped	76
Trees girdled	585
Square yards of willows and brush cut	860
Clay hogbacks shot out (linear feet)	3,526
Markers installed to mark channel	52

There was expended during the year on this work of improvement, $7,004.26.

About the only commercial use to which this stream is put at present is that of towing sunken logs and the rafting of railroad ties to market. There is considerable launch traffic conveying pleasure and hunting parties. Still it seems that the expenditure for the improvement is out of proportion to the beneficial results. This stream can not become a highway of commerce until more use below the mouth of the Sulphur River is made of Red River than is the case at the present time.

APPROPRIATIONS.

August 18, 1894 (allotted from appropriation for Red River)	$2,488.99
Act of Congress approved March 2, 1907	36,000.00
Act of Congress approved June 25, 1910	7,500.00
Total	45,988.99

ABSTRACT OF CONTRACTS IN FORCE.

There were no contracts in force on this work during the fiscal year.

COMMERCIAL STATISTICS.

SULPHUR RIVER, TEXAS AND ARKANSAS.

Vessel classification.

Class.	American.
Unregistered:	
Gasoline	2
Barges	1
Total	3

Freight traffic.

Article.	Amount, in short tons.	Valuation.
Railroad ties	471	$3,768
Sunken logs	1,027	8,216
Total	1,498	11,984

APPENDIX V.

IMPROVEMENT OF RIVERS AND HARBORS IN THE VICKSBURG, MISSISSIPPI, DISTRICT.

REPORT OF CAPT. CLARKE S. SMITH, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. **Red River, Louisiana and Arkansas, below Fulton, Ark.**
2. **Cane River, Louisiana.**
3. **Ouachita and Black rivers, Arkansas and Louisiana.**
4. **Ouachita River, above Camden to Arkadelphia, Ark.**
5. **Bayou Bartholomew, Boeuf River, Tensas River, and Bayou Macon, and bayous D'Arbonne and Corney, Louisiana and Arkansas.**
6. **Mouth of Yazoo River and harbor at Vicksburg, Miss.**
7. **Yazoo, Tallahatchie, Coldwater, and Big Sunflower rivers, Tchula Lake, Steele and Washington bayous and Lake Washington, and Bear Creek, Mississippi.**

United States Engineer Office,
Vicksburg, Miss., July 12, 1910.

Sir: I have the honor to send herewith annual reports for the fiscal year ending June 30, 1910, upon the works of river and harbor improvement of the Vicksburg, Miss., district. * * *

Very respectfully, your obedient servant,

Clarke S. Smith,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

V 1.

IMPROVEMENT OF RED RIVER, LOUISIANA AND ARKANSAS, BELOW FULTON, ARKANSAS.

Work for the improvement of the river below Fulton, Ark., to the head of Atchafalaya River, Louisiana, was continued during the fiscal year ending June 30, 1910, under the direct supervision of Mr. H. M. Marshall, assistant engineer, as follows:

GENERAL IMPROVEMENT.

Operations of the U. S. snag boat *C. W. Howell* were continuous, except during short periods, when the boat was undergoing minor repairs, and extended over the river between Fulton, Ark., and the mouth of Black River, Louisiana, 476.9 miles below. The *Howell* was in command of Robert Elflein, master.

The following is a summary of the work performed by the *Howell* during the year:

Snags pulled and destroyed	3,031
Stumps pulled and destroyed	3,426
Logs removed from channel	65
Shore snags cut	358
Leaning trees felled and cut up	1,158
Side jams broken up and destroyed	2

The crew of the U. S. snag boat *Columbia*, James H. Britton, master, was employed July 1 to 7 in transferring coal from Garland to the chute at Springbank, Ark., and from July 8 to 26 the boat worked over the river between Garland, Ark., and Shreveport, La., 129.7 miles below, and removed the following obstructions to navigation:

Snags pulled	227
Stumps pulled	35
Logs removed from channel	12

Upon completion of this work the *Columbia* was withdrawn from Red River.

The U. S. snag boat *Jos. E. Ransdell*, John W. Baxter, master, was temporarily transferred from the improvement of Ouachita River, and during the period from November 1 to December 14, 1909, inclusive, worked over the stretch of Red River between the mouth of Black River and the head of Atchafalaya River, Louisiana, 27.6 miles, removing all dangerous obstructions in the channel and performing such work along the banks as required attention. The following is a summary of what was done:

Snags pulled and destroyed	826
Stumps pulled	6
Shore snags cut	758
Leaning trees felled and cut up	725
Wreck destroyed (sunken coal barge)	1

The work of the snag boats was supplemented by that of two parties, equipped with tools, tackle, explosives, etc., as follows:

A force of laborers upon U. S. quarter boat *No. 5*, under Overseer William Thomas, commenced operations August 4, 1909, at Fulton, Ark.; continued downstream to St. Maurice, La., 328.7 miles; and performed the following work:

Channel snags cut and destroyed	4,080
Stumps destroyed	1,028
Shore snags cut and destroyed	19,785
Jams broken up and destroyed	7
Leaning trees felled and cut up	33,457

A number of large drift piles were burned.

This work was suspended at St. Maurice March 10, 1910, to await low water. In May, 1910, the quarter boat was towed upstream to Springbank, Ark., by the snag boat *Howell*, preparatory to resuming work in the upper river.

The second force of laborers, upon U. S. quarter boat *No. 9*, under Foreman Seiburn R. Goodrum, commenced work August 10 at Colfax, La., and continued downstream 116 miles to Joffrion, La., 1.8 miles above the mouth of Black River, where operations were discontinued December 21, 1909. The following is a summary of the work performed by this party:

Channel snags cut and destroyed	2,078
Stumps cut and destroyed	2,459
Shore snags cut	3,193
Logs removed from channel	202
Logs cut up along banks	7,799
Leaning trees felled and cut up	7,523
Trees girdled	34
Wrecks destroyed (sunken barges at Vick and below L. T. Norman Landing, Louisiana)	2

With a view to reviving the river trade, citizens of Shreveport purchased the steamboat *Lucille*, a vessel of 176 tons, built in 1908 (length 164 feet, breadth 30.3 feet, depth 4 feet), and had it renamed the *City of Shreveport*. This boat made its initial trip from New Orleans to Shreveport, La., December 30, 1909, to January 5, 1910, during which period the stages shown by the Shreveport gauge ranged from 5.3 feet, December 30, with a gradual decline, to 2.9 feet, January 5. The newspaper accounts of the trip stated that—

> Several all-night stops were made on Red River because of dense fog. The boat at no point came in contact with less than 7½ feet of water and could have gotten along even in less depth. The reason she did not leave New Orleans on the 28th of December, as expected, was on account of reports of a very low stage of the Red. The trip upstream showed the excellent condition of the river, which will enable the boat to make better time next trip.

DREDGE.

Plans and specifications for a steel hull, self-propelling hydraulic dredge and steel pontons and pipe line for same (see Report Chief of Engineers, 1909, p. 1549), were submitted to the Chief of Engineers through the division engineer February 11, 1910. They were received back, with notes for certain revisions, May 23, 1910. It is expected to advertise for bids for construction in the near future.

SURVEY.

Reference is invited to last year's report upon the survey (pp. 1549 and 1550, Report Chief of Engineers, 1909).

Mapping, etc., was continued at the office until October, 1909. Field work was resumed in November at Grand Ecore, Louisiana, and was carried downstream 126.5 miles to Barbin Landing, Louisiana, where it was suspended January 22, 1910, by a rise of the river, and since then mapping, etc., has been continued.

The maps show radical changes of bank lines and river bed. Cutoffs have shortened the distance between Sulphur River, Arkansas, and Cane River, Louisiana, from 216.5 miles by the earlier surveys to 190.5 miles by the recent survey. Caving bends have increased the distance below Cane River to Barbin Landing, Louisiana, from 123.5 miles to 126.5 miles. The river is larger and straighter, due to confinement of the water. The profiles of the 1891 and 1909 surveys between Grand Ecore and Barbin Landing, Louisiana, have been platted together for purposes of comparison and are shown on the accompanying prints.

A preliminary report was submitted August 31, 1909.

LEVEES.

No levees were built by the United States during the year.

The amounts expended during the year and the unexpended balances July 1, 1910, were as follows:

Allotments.	Expended during year.	Balances unexpended July 1, 1910.
General improvement	$49,079.05	$73,276.11
At Shreveport, La.		9,308.96
At Alexandria, La.		6,734.67
Dredge	2,321.43	86,296.86
Survey	1,087.32	2,506.61
Levees	.50	31,094.43
Total	52,488.30	209,217.64

The unexpended balances are to be applied to the purposes designated in the column of allotments.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $20,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

The appropriations for early work, from 1828 to 1852, as given upon page 354 of House Document No. 421, Fifty-seventh Congress, second session, amount to $533,377.50. Of this amount $3,545.60 was carried to the surplus fund.

The appropriations under the project of 1872 and its modifications have been as follows:

June 10, 1872	$20,000.00 150,000.00	August 11, 1888	$65,000.00 35,000.00
March 3, 1873	80,000.00	September 19, 1890	100,000.00 28,000.00
June 23, 1874	50,000.00	July 13, 1892	145,000.00
March 3, 1875	20,000.00	August 18, 1894	150,000.00
August 14, 1876	35,000.00	June 3, 1896	100,000.00
April 10, 1869	[b] 4,500.00	March 3, 1899	150,000.00
February 7, 1878	6,000.00	June 13, 1902	125,000.00
June 18, 1878	24,000.00 25,000.00	March 3, 1905	100,000.00
March 3, 1879	15,000.00 22,500.00 10,000.00	March 2, 1907	150,000.00
June 14, 1880	25,000.00 60,000.00 10,000.00	March 3, 1909 (allotment authorized Apr. 6, 1909)	65,000.00
March 3, 1881	10,000.00 10,000.00	June 25, 1910	75,000.00
August 2, 1882	75,000.00	Total	2,090,000.00
July 5, 1884	75,000.00	Aggregate of all appropriations	2,623,377.50
August 5, 1886	75,000.00	Receipts from sales	5,668.27

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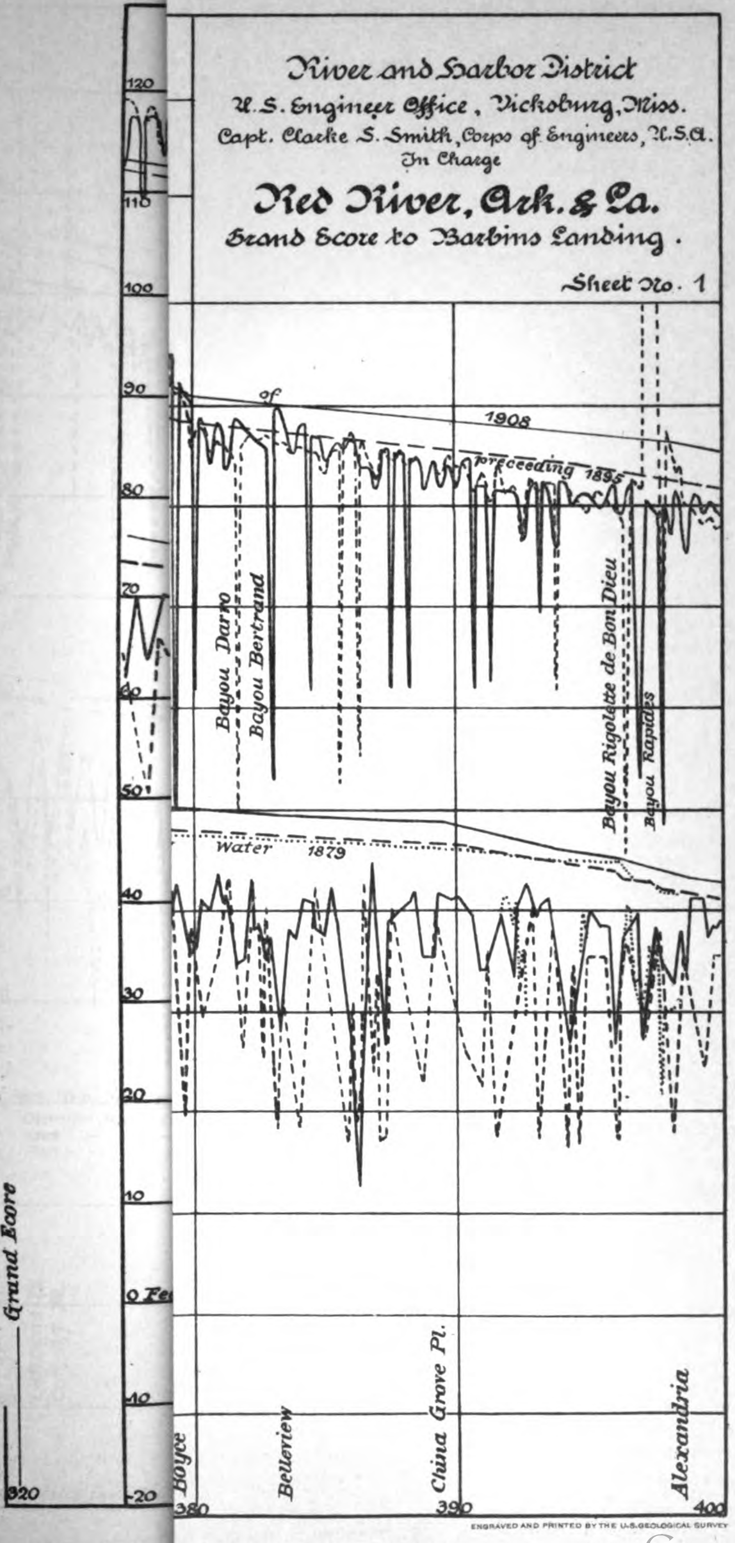
[a] Exclusive of the balance unexpended July 1, 1910.

[b] Allotment made August 27, 1877, from appropriation for examinations, surveys, and contingencies of rivers and harbors, for closing Tones Bayou.



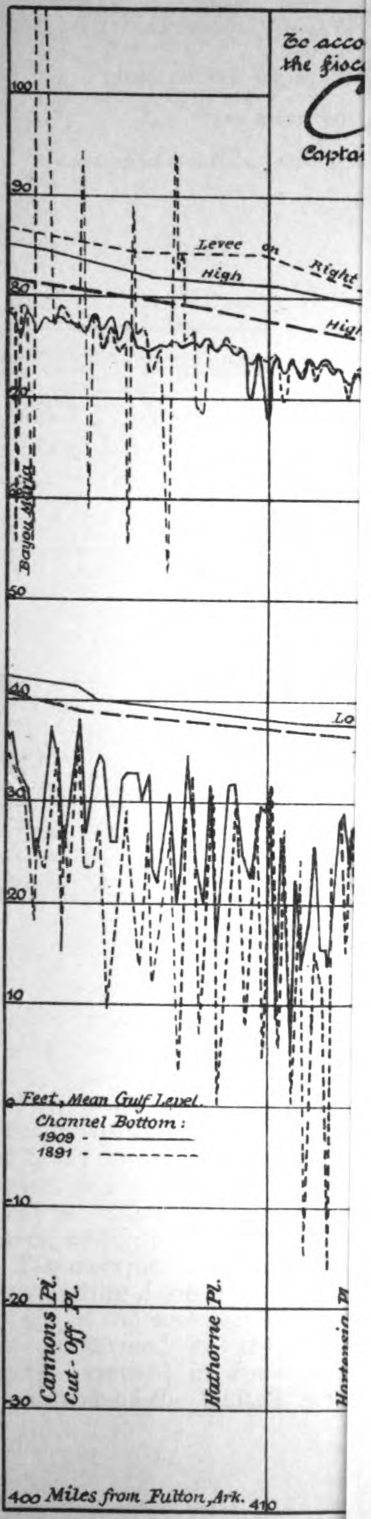
River and Harbor District
U. S. Engineer Office, Vicksburg, Miss.
Capt. Clarke S. Smith, Corps of Engineers, U. S. A.
In Charge

Red River, Ark. & La.

Grand Ecore to Barbins Landing.

Sheet No. 1

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY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50
40
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20
10
0 Feet, Mean Gulf Level.
-10
-20
-30
Levee on
Right
High
High
Lo
Bayou Maria
Channel Bottom:
1909 - ______
1891 - --------
Cannons Pt.
Cut-Off Pt.
Hathorne Pt.
Hortensia Pt
400 Miles from Fulton, Ark.
410

COMMERCIAL STATISTICS, YEAR ENDING JUNE 30, 1910.

RED RIVER, LOUISIANA AND ARKANSAS.

Season of navigation.—Opened December 1, 1909; closed May 31, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered: Steamers	3	273
Unregistered:		
Steamers	1	....
Barges	8	....
Rafts	18	....
Total	30	273

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.
Cotton	555 bales	166	$49,800	300
Lumber	195,000 feet b. m.	560	5,600	350
Staves	1,200	24	288	80
Provisions	20 packages	2	135	80
Grain	200 sacks	16	500	80
Saw logs	14,750,000 feet b. m.	59,000	118,000	120
Miscellaneous	2,300 packages	172	11,465	300
Total		59,940	185,788	....

NOTE.—All large boats withdrawn by reason of boll weevil damage to crops. Majority of saw mills made no report.

V 2.

IMPROVEMENT OF CANE RIVER, LOUISIANA.

This work was suspended in June, 1909, and the river is not considered worthy of further improvement at this time, as it was placed in fairly good condition for navigation during the periods of high water, and the amount of commerce involved is not considered sufficient to justify further expenditures. (See Report, Chief of Engineers, 1909, pp. 1553 and 1554.)

The unexpended balance July 1, 1909, was disbursed in July to pay outstanding June accounts, $1,439.03, and a proper proportion of the salary of the assistant engineer under whose local direction the work was performed, $138.84; a total of $1,577.87. A refundment of 50 cents, overpaid in June, 1909, was deposited to the credit of the Treasurer of the United States.

APPROPRIATIONS.

The appropriations have been as follows:

By act of July 5, 1884 (see p. 257, H. Doc. No. 421, 57th Cong., 2d sess.)	$2,500
By act of March 2, 1907 (allotment authorized Feb. 27, 1909)	2,000
Total	4,500

V 3.

IMPROVEMENT OF OUACHITA AND BLACK RIVERS, ARKANSAS AND LOUISIANA.

GENERAL IMPROVEMENT.

The U. S. snag boat *Jos. E. Ransdell*, John W. Baxter, master, was employed in Ouachita and Black rivers from July 1 to October 31, 1909, and from December 15, 1909, to January 31, 1910, and then was laid up at the site of Lock No. 4, 5½ miles below Monroe, La. During this period operations extended from the mouth of Black River, Louisiana, to Lock No. 8, Arkansas, 296¼ miles upstream. The boat was temporarily transferred to lower Red River November 1 to December 14, 1909.

The following is a summary of the work performed by the *Ransdell* in Ouachita and Black rivers:

	Number.
Snags pulled and destroyed	3,048
Stumps pulled and destroyed	784
Shore snags cut	275
Jam broken up and destroyed	1
Leaning trees felled and cut up	675
Trees girdled	80
Wreck removed (sunken ferry flat in Black River)	1

A force of laborers upon U. S. quarter boat *No. 10*, under Foreman Carlous E. M. Henry, and equipped with tools, tackle, explosives, etc., commenced work at Camden, Ark., August 11, and continued downstream to Lock No. 4, Louisiana (172¾ miles), where operations were suspended December 29, 1909. The following work was done by this party:

	Number.
Channel snags cut and destroyed	5,452
Stumps cut and destroyed	4,864
Shore snags cut and destroyed	9,648
Logs removed from channel	846
Leaning trees felled and cut up	2,581
Leaning trees topped	1,903

The work for general improvement of the river was conducted under the local supervision of Mr. H. M. Marshall, assistant engineer. The construction of locks and dams was under the immediate supervision of Mr. T. C. Thomas, assistant engineer, with Mr. John W. Henderson, junior engineer, in local charge of hired labor work at Lock 4, and Mr. Edgar S. Maupin, junior engineer, in local charge of hired labor work at Lock 8. Messrs. Hermann A. Philippi and James C. Taylor were the local inspectors of contract work at Locks 2 and 6, respectively.

LOCK AND DAM NO. 4.

This work, together with Lock and Dam No. 6, was left to the Chicago Engineering and Constructing Company, of Chicago, Ill., under a contract dated September 7, 1904, and two supplementary agreements dated, respectively, April 24 and September 6, 1905. The contract was terminated by a third supplementary agreement dated October 20, 1908, and the construction of Lock No. 4 by hired labor and purchase of material was authorized by the Chief of Engineers October 23, 1908.

Construction work for current fiscal year was delayed until the 2d of August by high-river stage. Previous to that time the trestle paralleling the land wall of lock was rebuilt, two derricks framed, and miscellaneous repairs made to plant. Began placing puddle in cofferdam August 2 and finished September 24, when 2,556 cubic yards had been placed in the original cofferdam, bringing the fill to 12.5 feet above local low water, and 2,604 cubic yards were placed in the reenforcement built outside the old structure. In addition, 1,640 cubic yards of clay were deposited in the deep hole scoured at the upper outer corner of coffer. Puddle material was dug from the river bed, barged to lock site, and placed with clam shell. The driving of sheet piling in the coffer reenforcement was completed August 21, with one driver working double shift. Two hundred and twelve piles were driven, the average penetration being 9.3 feet.

The cofferdam was unwatered August 13 to 19, and excavation of lock pit was begun on the 23d with three shifts of men. The greater part of the foundation piling being already driven, it was necessary to excavate with spades, the material being loaded into skips and lifted out with derricks. Excavation was continued, with a gradually diminished force, until the latter part of November, when this feature of the work—for the lock—was completed.

Began driving foundation piling September 1, with one driver working double shift. On the 13th a second driver, also working double shift, began driving permanent sheet piling. Both classes of driving were completed October 19. The 164 foundation piles driven during the season have an average penetration of 22.4 feet, the 515 sheet piles having an average penetration of 13 feet.

The erection of concrete forms was begun October 4, and concreting was inaugurated on the 14th. This feature of the work was prosecuted until December 13, being then suspended on account of high-river stage, with 1,853 cubic yards yet to be placed of a total of 10,710 cubic yards in the lock. Of this amount yet to be placed, 168 cubic yards are required in the river wall, 350 yards in the downstream gate abutment of the land wall, and 1,335 yards in the downstream half (about) of the lock floor. The upstream guard and miter sills were placed, upstream guard dam installed, and the four intake valves with their maneuvering gears and two of the discharge valves were set.

Ouachita River began to rise rapidly December 8, and on the 13th several serious leaks developed in the cofferdam. These were dug down to and stopped with sacks of earth, but on the 14th, with a head of 14 feet on the coffer, new and more serious leaks developed, and it was decided to flood the lock pit. All material and plant, except the traveling derrick, were removed and the water was admitted the evening of the 14th. The working force was reduced from 189 to 49 men on the 16th.

During the remainder of December and early part of January 2,100 cubic yards of backfill were placed around the upstream return wall of lock and against the adjacent portion of the land wall. The fill was then paved with sacks of earth as a temporary protection, 1,050 sacks being used.

During latter part of the working season there was adopted the plan of building the walls to about 10 feet above low water instead of to full height, with the view of advancing the wall construction to such a stage that the cofferdam could be dispensed with at the end of the season, the partially constructed walls and the guard dams to act as a coffer for the completion of the work. The early high water prevented the completion of this programme, one section of land wall and the downstream guard remaining to be placed at cessation of work. Sufficient had been accomplished, however, to permit the removal of the old cofferdam, except a portion of the downstream end; the retained part to be joined to the downstream end of the river wall by a short auxiliary coffer wall; the combination of old and new coffer wall, river wall of lock, upper guard dam, and upper section of land wall to be used as a cofferdam for completing the lock. The round and sheet piling for the auxiliary coffer wall were driven in February and the puddle fill brought up to about 1 foot above low-water mark.

During same month a 30-foot gap was made in the downstream end of the present cofferdam, sheet piling being pulled up and puddle fill removed down to the level of the coffer reenforcement.

The hydraulic dredge and floating derrick were placed in repair, and on March 20 were transferred, with barges and other plant, to Lock No. 6. This plant was brought back on April 25 and the dredge machinery and cabin were transferred to barge *No. 077.* Began dredging on April 9 at the mouth of River Styx, afterwards moving upstream, in succession to Zephs Reach, Loch Lomond shoals, Ouachita City, Fish Trap, and Shiloh shoals. The gravel dredged was towed to the lock site and stored. This work was stopped June 14, after having obtained 3,795 cubic yards of washed gravel—practically sufficient, in conjunction with that already on hand—for the concrete, riprap pavement, and gravel fill remaining to be placed in both lock and dam.

Four cases of smallpox developed at the lock site the latter part of October. The pronounced cases were removed to the Ouachita Parish pesthouse, and suspects were isolated. Quarters and bedding were disinfected, the entire force vaccinated, and a physician employed to observe all cases of sickness—with the result that no new cases developed.

The average force employed at Lock No. 4 during the season of active operations was 214 men.

On the basis of plant installed, material delivered and work done, Lock No. 4 is estimated to be about 90 per cent completed.

A survey was made of the lock site in July, 1909, and a number of river cross sections were sounded January 29 and May 21, 1910. These examinations indicate little change in the river bed since the survey of August, 1908, which showed that the discharge area outside the lock cofferdam and below the level of the top of that structure had enlarged to 91 per cent of the original unobstructed area below the elevation named.

LOCK AND DAM NO. 6.

This work, in conjunction with Lock and Dam No. 4, was let under a contract entered into September 7, 1904, and terminated October 20, 1908. The completion of the work under a new contract was authorized by the Chief of Engineers October 23, 1908.

Revised plans and specifications were prepared and submitted January 30, 1909, were approved March 15, and proposals for construction were invited by two months' advertisement, from March 26 to May 26, 1909. Only two bids were received in response to this advertisement, the lowest aggregating $213,190.50, upon the estimates used for canvassing. The price bid for concrete work, which is the controlling factor, was considerably in excess of the corresponding price in the contract of 1908 for Lock 2, and after reserving from the appropriation the amount estimated to be necessary for prosecuting work at Lock 4, the balance was insufficient to cover the cost of the construction contemplated at Lock 6, and the bidder declined to perform a less amount of work than that bid on, either at his proposed or at increased unit prices.

Under authority of the Chief of Engineers dated July 30, 1909, both bids were rejected, and a contract for the partial completion of the lock was entered into with The H. E. Talbott Company, of Dayton, Ohio, August 19, 1909, the work contemplated under this contract being the completion of the lock foundation, placing the lock floor, the construction of the upstream return wall of lock and 225 feet of the land wall, the completion of the mound, and the laying of the riprap pavement above the lock and back of the portion of the land wall constructed.

Work was inaugurated August 23, when a force of teams and scrapers began on the mound, partially built December, 1904, to January, 1905. The mound was completed to the required elevation of 0.87 foot above local high water of 1894 on October 19. August 25 a second force began clearing right of way for 4 miles of narrow-gauge railroad, to extend from the lock site to the El Dorado and Bastrop Railway, at a point near the town of Felsenthal, Ark. Preparation of roadbed was prosecuted during September, rails were laid in October, and the surfacing of track was completed the following month.

The old labor quarters, built in 1905, were repaired and foremen's quarters were built in September. Power house, blacksmith shop, and commissary were built on the mound in October, electric-light and water-supply systems being installed during the same month. A general warehouse was built at the railroad junction in October, and a cement warehouse was erected at the same place in December.

Grading for and laying of track for the movable tower of a cableway and the erection of towers for same began in September. Construction material and plant began to arrive during the latter part of August; rolling stock for the narrow-gauge arrived in October; boilers, engines, and dynamos were installed in power house in last-named month; cableway across the river completed and concrete mixer installed in November; and a revolving screen for separating sand and gravel was put in place the following month.

Round piling for the upper end of the lock cofferdam and round and sheet piling for the side paralleling the river had been driven in the latter part of 1907 under the old contract. Work on the cofferdam was renewed September 24, 1909, with one driver working triple shift, in the general case, and continued through following month, when 54 round and 310 sheet piles had been driven to average penetrations of 12.4 and 8.3 feet, respectively. This completed the coffer walls, excepting a 25-foot gap at the lower outer corner and small gaps at the land ends impracticable to close with a floating driver at other than medium and high stages.

Driving of foundation piles began under present contract on November 12, with one driver working triple shift in the general case. On the 22d a water jet, with pump, was installed on the driver. Driving was continued until December 11, and was then suspended on account of river stage being too high for satisfactory work, leaving 654 foundation piles to be driven. The 541 piles driven have an average penetration of about 17.4 feet; 149 piles driven without the jet have an average penetration of 16.1 feet; 268 driven with jet, an average of 18.7 feet; and 124 driven with jet, but with a follower between hammer and pile, an average of 16.2 feet penetration. A 2,800-pound drop hammer in 40-foot leads was used. The 618 foundation piles placed in 1907 have an average penetration of about 17 feet, the driving having been done with a No. 1 Warrington steam hammer in conjunction with water jet, no follower being used.

Excavation began November 11 with grading of bank behind the proposed land wall. An orange-peel bucket, operated from the cableway, was used, and the material was deposited in the cofferdam. This work was suspended December 13 after placing 1,775 cubic yards of puddle.

The river began rising rapidly December 13 and reached a nearly bank-full stage on the 22d, on which date active operations were suspended and the working force in large part was disbanded. During the last week of active work 17 sheet piles were placed in the gap left at the inner upstream end of the cofferdam, driving having been done with suspended leads operated from the cableway. February 14 to 24 a small force was employed closing this gap. The driver barge sank on the night of the 22d, before the projected driving was finished, and the closure of the gap was completed by building a bulkhead between the inner and outer walls of the cofferdam, the former wall having been previously extended to top bank. The adjacent bank was then paved with sacks of earth, the pavement being extended in March, a total of 679 sacks having been placed.

The local river stage declined to 6.6 feet February 19, and, rising again, overtopped the cofferdam on March 23. Some scour occurred at the upstream end of the cofferdam near the outer corner, which will make necessary the renewal of several of its panels.

Ouachita River was below the 14-foot stage for fifty-one working days from date of contractor's acknowledgment of receipt of notification of approval of contract to the end of the effective working season, December 14—the stage named being that on which the time limit for completion of the contract is based.

The average force employed during the period of active operations was 80 men.

A dredging plant was transferred from Lock 4 the latter part of March for the purpose of securing gravel and sand sufficient for the concrete, etc., involved in the construction of Lock No. 6 and not covered by the present contract. Operations began at Lower Shiloh shoals on March 23 and terminated April 22, when approximately 3,300 cubic yards of washed gravel and 1,000 yards of sand had been dredged, towed to lock site, and stored on the bank. The sand and gravel obtained is estimated to be sufficient for the purpose named above. The dredging plant was returned to Lock No. 4.

On the basis of plant installed, material delivered, and work done, Lock No. 6 is estimated to be about 30 per cent completed.

PLANT USED IN TOWING.

The U. S. towboat *H. St. L. Coppee* was employed on the lock and dam work from March 6 to June 24, 1910.

Leaving Vicksburg with two barges of coal on date first named, boat reached Franklin shoals, 515 miles distant, on March 23, having transferred 200 tons of coal to dredging work at Lock No. 6 en route, and returning reached Vicksburg April 1. Leaving Vicksburg April 2, the *Coppee* proceeded to Madox Bayou, White River, and received five barges of riprap coming out from the United States quarry at Searcy, Ark.; passed Greenville and added one barge of coal to her tow; and, continuing its trip, reached Franklin shoals May 3, having left one barge of riprap and the coal barge at Lock No. 4. Returning, the *Coppee* reached Vicksburg May 19. The cost per ton-mile for this trip was 19 cents.

The *Coppee* proceeded to Greenville May 21–24 and returned with three barges of riprap to Vicksburg, where it added two barges of coal, and, continuing, reached Franklin shoals June 10. Returning, the *Coppee* reached Vicksburg June 25 and was transferred to the third district, improving Mississippi River.

The U. S. snag boat *Jos. E. Ransdell* was employed from March 20 to April 22 in towing dredge fleet and sand and gravel for the Lock No. 6 work and from April 22 to June 16 on same duty for Lock No. 4. The U. S. steamer *Thos. B. Florence* was employed at Lock No. 8 until July 8, then transferred to Lock No. 4, where it was used in towing puddle barges principally. December 16 it returned to Lock No. 8, where it has since been employed in towing gravel and miscellaneous material.

Five barges were borrowed from the fourth district, improving Mississippi River, for the transportation of gravel to Locks Nos. 4 and 6. They were delivered to the *Coppee* at mouth of Red River on March 12, and were returned to the fourth district by that steamer at Giles Bend, Mississippi River, June 24.

LOCK AND DAM NO. 2.

A contract for the construction of this lock, complete except lock-keeper's dwelling, was let to The Midland Bridge Company, of Kansas City, Mo., August 7, 1908, and operations under the contract began on the 11th of September following.

During the present fiscal year resumption of construction work was delayed by high river stages until August 27, 1909. The intervening time was employed erecting new camp buildings, preparing sheet piling for cofferdam, erecting derrick for unloading material from barges, and miscellaneous repairs to plant.

Active construction work was inaugurated by placing wale timbers and driving sheet piling for the cofferdam, followed by the placing of tie rods as the river fell. This work was completed November 18, with exception of a 60-foot gap at lower outer corner of coffer, left for ingress and egress of floating plant. Excavation of lock pit began October 16 with a 10-inch hydraulic dredge, material being deposited between the coffer walls as puddle.

Two orange-peel dredges were shortly added to the excavating plant, the first on October 20, the second on November 22. The hydraulic dredge was withdrawn December 4, having reached a material too resistant for removal by that method without the use of an agitator. The orange-peels continued at work until December 11, when operations were suspended on account of a rapid rise of the river. This terminated active construction work for the season, the river having maintained a high stage to date, with exception of intervals too short to justify resumption of work in the river bed. Of the 6,608 cubic yards of material excavated, 6,258 cubic yards were used as puddle fill, the remainder being deposited outside the cofferdam, as it was considered unsuitable for use in that structure. The puddle fill now in place is 83 per cent of that required for the lock cofferdam.

The dredging, towing, and storing of sand and gravel for use as concrete aggregate, which had been in progress during July and August, was resumed in December and has continued to date. There was stored at the lock site on the first of June, 9,422 cubic yards of gravel and 3,643 of sand; being 70 per cent and 56 per cent, respectively, of the total amounts of these materials required for the lock.

The average force employed during the working season was 61 men.

On the basis of plant installed, material delivered, and work done, Lock No. 2 is estimated to be about 20 per cent completed.

LOCK AND DAM NO. 8.

The construction of this lock and dam by hired labor and the purchase of material was authorized by the Chief of Engineers, October 19, 1907, and operations began with the clearing of left bank at lock site on December 27 following.

Operations for the current fiscal year began July 9 with resumption of excavation in the lock pit, an orange-peel dredge being used, and the material was placed in the cofferdam. Dredge was withdrawn from pit later in the month, and the gap at lower outer corner of cofferdam was closed from July 22 to end of month; the puddle fill in gap being brought at first to one foot above water surface only. Cofferdam was pumped out July 29 to August 3, and puddle fill completed August 11 with material dredged from river bed and barged to cofferdam, 5,000 cubic yards being placed.

Excavation of lock pit was resumed, with a force of teams and scrapers, on August 4, and was practically completed by end of the month. Erection of drivers in the pit began August 16 and driving was started on the 23d with one No. 2 Warrington steam hammer, working double shift. A second steam hammer, also working double shift, began September 6, and the placing of foundation piling for lock—excepting return walls—was completed on the 15th. The foundation piles for the upper return wall (65) were driven in November and January, and 20 foundation piles were driven in lower return wall in November. The 2.050 round piles driven have an average penetration of 12.9 feet, the length below cut-off averaging 14.4 feet. The permanent sheet piling was driven September 14 to 23, using one hammer on the 14th and 15th and two after the latter date, both hammers running double shift. The 858 sheet piles placed have an average penetration of 9.5 feet, length below cut-off being 11.6 feet.

Preparation of lumber for concrete forms was carried on in the wood-working shop as oportunity offered, from the beginning of the fiscal year, and the erection of forms in the lock pit was begun September 23. Concreting began September 30, and was prosecuted as forms were prepared and material secured until December 11, when 6,388 cubic yards had been placed of a total of 11,188 cubic yards in the lock. Of the 4,800 yards of concrete remaining to be added to the lock, 3,090 are included in the floor, none of which has yet been placed.

The river began rising rapidly December 6, and on the morning of the 13th stood within 1.5 feet of top of cofferdam, the maximum head on which was 18 feet. One leak developed at inshore downstream end of cofferdam, where the fill was a pure clay; otherwise the behavior of the structure was perfect. The single leak was near the top of the puddle and could have been controlled easily, but as it was evident that the cofferdam would be overtopped in a short time, it was decided to flood the work. All machinery and material were removed from the lock pit and the river admitted through the small needle dam provided for the purpose on the evening of the 13th.

December 15–19, 27 foundation piles were driven for the upstream return wall. Piles were driven as a trestle, to support the driver as it worked out from top bank. Forty-foot triple lap sheet piling was then driven along upper side of trestle, their tops being left level with top bank, and the adjacent bank was sacked to prevent flanking of the land wall. In latter part of December and early part of January 4,100 barrels of cement were hauled from Calion station, on the Chicago, Rock Island and Pacific Railway, to El Dorado landing, towed to lock site, and stored. Dredging gravel for concrete aggregate was resumed January 24 and continued until May 26, as river stages permitted, when 8,777 cubic yards had been obtained, making a total of 9,877 cubic yards now stored at the lock site. This is estimated to be sufficient for the completion of the lock and dam, including the gravel required for concrete, riprap pavement, and fill under masonry of dam.

In March and June 850 tons of coal were delivered on barges at lock site and stored. In May and June 3,060 cubic yards of light riprap were received and unloaded. The coal is considered ample for next season's work, and the light riprap is all that will be required for both lock and dam.

The average force employed during the working season was 183 men.

Lock No. 8 is estimated to be about 80 per cent completed on the basis of plant installed, material delivered, and work done.

The amounts expended during the year and the unexpended balances July 1, 1910, were as follows:

Allotments.	Expended during year.	Balance unexpended July 1, 1910.
Maintenance of improvement	$32,010.57	$55,472.12
Snag boat	6,103.81	....
Locks and Dams Nos. 4 and 6	152,337.47	460,660.30
Locks and Dams Nos. 2 and 8	170,017.65	433,505.05
Surveys, acquiring sites, etc	....	10,000.00
Total	360,469.00	959,637.47

The balances are to be applied to the purposes designated above in the column of allotments.

The additional amount estimated for is to be applied to completing work at Locks and Dams Nos. 2, 4, 6, and 8, $492,000.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] [b] $492,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

The appropriations from 1871 to 1899, as given upon page 353 of House Document No. 421, Fifty-seventh Congress, second session, amount to $621,500.

The appropriations under the existing project of 1902 have been as follows:

June 13, 1902	$31,500.00
June 13, 1902	80,000.00
March 3, 1903	250,000.00
March 3, 1905 (river and harbor act)	80,000.00
March 3, 1905 (sundry civil act)	12,000.00
June 30, 1906 (sundry civil act)	91,954.00
March 2, 1907 (river and harbor act)	200,780.00
May 27, 1908 (sundry civil act)	225,000.00
March 3, 1909 (river and harbor act, allotment authorized Apr. 6, 1909)	160,000.00
March 4, 1909 (sundry civil act)	40,312.00 135,823.00
June 25, 1910 (river and harbor act)	521,000.00
Aggregate of all appropriations	2,449,869.00
Receipts from sales	1,840.11

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] $200,000 of this amount to be authorized for contracts, and balance to be cash appropriation; appropriations for the four locks and dams to be made in lump sum unallotted.

CONTRACTS IN FORCE.

1. **Name of contractor:** The Midland Bridge Company.

Character of work: Building Lock No. 2 in Ouachita River at Harrisonburg, La.

Date of contract: August 7, 1908. Approved September 11, 1908.

Date of beginning work: September 14, 1908.

Contract expires after "250 working days during which natural conditions are such as to permit working inside the cofferdam required" (estimated to be about four years).

Classification.	Unit.	Quantity.	May be increased.	May be diminished.	Price.
			Per cent.	*Per cent.*	
Excavation	Cubic yards	16,600	20	20	$0.50
Back fill and embankment	do	15,100	20	20	.50
Foundation piles	Linear feet	49,100	20	40	.60
Sheet piling, wooden	Feet b. m	136,100	20	50	[a] 70.00
Sheet piling, steel	Square feet	1,590	100	100	1.50
Portland cement, concrete	Cubic yards	14,940	10	10	10.00
Structural steel	Pounds	310,600	10	10	.08
Steel cover plates	do	7,700			.05
Cast iron	do	7,500	10	10	.12
Cast steel	do	24,100	10	10	.14
Steel reenforcement (except lock floor)	do	700	10	10	.04
Steel reenforcement (for lock floor)	do	409,000	10	100	.04½
Bolts and special irons	do	9,900	15	15	.10
Gas pipe, 1¼ inches in diameter	Linear feet	275	10	10	.20
Framed timber	Feet b. m	33,700	10	10	[a] 50.00
Sills and posts, oak	do	6,400	10	10	[a] 120.00
Heavy riprap filling	Cubic yards	654	20	20	8.00
Riprap paving	Square yards	4,800	20	20	2.00
Concrete sidewalk	do	40	20	20	3.00
Channel dredging	Cubic yards	17,000	20	100	.40
Log chain	Pounds	4,800	10	10	.10
Gauge, tile	Linear feet	54	10	10	5.00
Piling in cofferdam	do	7,300	25	25	.60
Lumber in cofferdam	Feet b. m	252,500	25	25	[a] 50.00
Sand bags	Number	750	100	50	.20

[a] Price per 1,000 feet b. m.

2. **Name of contractor:** The H. E. Talbott Company.

Character of work: Partial construction of Lock No. 6 in Ouachita River near Roland Raft, Ark.

Date of contract: August 19, 1909. Approved October 9, 1909.

Date of beginning work: August 23, 1909.

Contract expires after "170 working days during which natural conditions are such as to permit working inside the cofferdams required" (estimated to be about two years).

Classification.	Unit.	Quantity.	May be increased.	May be diminished.	Price.
			Per cent.	*Per cent.*	
Excavation	Cubic yards	7,000	20	20	$0.80
Backfill and embankment	do	2,710	25	80	.60
Fill in mound	do	3,700	15	15	1.00
Foundation piles	Linear feet	25,200	20	20	1.00
Sheet piling	Feet, b. m	158,000	20	20	[a] 100.00
Concrete	Cubic yards	5,530	25	25	14.45
Structural steel	Pounds	3,500	20	20	.12
Cast iron	do	3,800	20	20	.12
Cast steel	do	4,400	20	20	.12
Steel reinforcement (except lock floor)	do	200	100	20	.12
Steel reinforcement (in lock floor)	do	328,000	10	20	.05
Bolts and special irons	do	4,960	20	20	.12
Framed timber	Feet, b. m	6,300	20	20	[a] 110.00
Gravel filling	Cubic yards	400	20	20	1.00
Riprap paving	Square yards	1,390	20	20	3.00
Drain tile (8-inch)	Linear feet	1,330	10	10	.50
Drain tile (10-inch)	do	860	10	10	.50
Drain tile (12-inch)	do	47	10	10	.50
Round piling in cofferdam	do	800	75	20	.75
Lumber in cofferdam	Feet, b. m	106,000	75	20	[a] 70.00
Sand bags	Number	1,000	100	50	.25
Asphaltic cement	Gallons	40	50	25	1.00

[a] Price per 1,000 feet, b. m.

8. Name of contractor: United Kansas Portland Cement Company.

Character of work: Furnishing and delivering about 14,000 barrels Portland cement (subject to increase or diminution of 15 per cent), for use at Locks 4 and 8. Price per barrel of 375 pounds, delivered in sacks: At Calion or Stark, Ark., $1.67. On lock switch of St. Louis, Iron Mountain and Southern Railway, at Monroe, La., $1.44. The United States to pay 10 cents for each sack not returned to contractor at point of delivery.

Emergency contract dated October 19, 1909; no specific time limit. Deliveries estimated to extend over ten months. Total quantity delivered, 11,630 barrels.

COMMERCIAL STATISTICS, YEAR ENDING JUNE 30, 1910.

OUACHITA AND BLACK RIVERS, ARKANSAS AND LOUISIANA.

Season of navigation.—Opened December 15, 1909; closed June 30, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered: Steamers	9	535
Unregistered:		
Barges	10	
Rafts	31	
Total	50	535

Freight traffic.

Article.	Amount.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	198 bales	119	$35,700	45	$0.0090
Cotton seed	9,158 sacks	572	14,300	60	.0064
Hides and skins	62 bundles	3	1,200	40	(a)
Live stock	653 head	251	18,060	72	(a)
Lumber	615,000 board feet	1,537	15,370	54	(a)
Staves	338,416	4,180	60,160	124	(a)
Provisions	7,105 packages	532	35,500	65	(a)
Grain	7,499 sacks	600	18,752	65	(a)
Saw logs	14,806,240 board feet	59,269	118,538	60	(a)
Coal		100	400	72	(a)
Steel		13	2,340	72	(a)
Hay		10	200	72	(a)
Miscellaneous	4,953 packages	701	46,700	70	(a)
Total		67,887	357,220		

[a] Not obtainable.

NOTE.—Parker Line boat sold; Monroe Railway and Navigation Company boat destroyed and all records lost; two boats of Carter Line destroyed and records lost.

V 4.

IMPROVEMENT OF OUACHITA RIVER ABOVE CAMDEN TO ARKADELPHIA, ARK.

No work has been performed in this part of Ouachita River since November, 1890. (See Report, Chief of Engineers, 1891, p. 1975).

It is proposed to apply the funds recently appropriated to the removal of snags, leaning timber, and similar obstacles which have accumulated since 1890 and which render navigation difficult during the period of high water between December and May.

No additional funds will be required during the fiscal year ending June 30, 1912.

In view of the important work undertaken for the development of Ouachita River below Camden and of the commercial interests to be served by extending navigation farther upstream, the portion of the river from Camden to Arkadelphia is considered worthy of improvement to the extent of removing snags, leaning trees, etc.

APPROPRIATIONS.

PREVIOUS PROJECTS.

March 3, 1871, from Arkadelphia, Ark., to Louisana state line	$25,000
June 10, 1872, from Arkadelphia, Ark., to Louisiana state line	60,000
August 11, 1888, above Camden to Arkadelphia, Ark	9,000
Total	94,000

The above appropriations are given upon page 353 of House Document No. 421, Fifty-seventh Congress, second session, and are included in the list of appropriations in the preceding report. (Appendix 3.)

EXISTING PROJECT (FOR MAINTENANCE).

June 25, 1910	$10,000

The present commerce of this section of the river consists principally of floating saw logs to mills farther downstream. In 1909 it was reported by one mill at Monroe, La., that nearly one million feet board measure of cypress logs were rafted during that year. Other commerce, however, is small, and has declined in recent years.

It is claimed that the railroad rates, in comparison with the river rates, are excessive, an instance of a shipment of coffee and molasses, 1,570 pounds, from New Orleans, La., to Arkadelphia, Ark., having been cited, as follows:

By river, New Orleans, La., to Camden, Ark., 584 miles, freight charges	$5.50
By rail, Camden to Arkadelphia, Ark., 50 miles, freight charges	3.68
Total	9.18

V 5.

IMPROVEMENT OF BAYOU BARTHOLOMEW, BOEUF RIVER, TENSAS RIVER, AND BAYOU MACON, AND BAYOUS D'ARBONNE AND CORNEY, LOUISIANA.

Operations in these tributaries of Ouachita River during the fiscal year ending June 30, 1910, were continued under the local supervision of Mr. H. M. Marshall, assistant engineer, as follows:

(A) BAYOU BARTHOLOMEW.

No work was performed in Bayou Bartholomew, as the available plant was employed elsewhere during the period of low water.

It has been the practice to alternate the use of boats in these tributaries, as there is not sufficient work to warrant the first cost and the annual charges for maintenance and repairs of a separate quarter boat and outfit of tools, etc., for each stream.

(B) BOEUF RIVER.

A party equipped with tools, tackle, and explosives upon U. S. quarter boat *No. 3*, and under the direction of Foreman John M. Cowan, resumed work July 26, 1909, at the Vicksburg, Shreveport, and Pacific Railway bridge near Girard, La., and carried it upstream to Wright Ferry, 139 miles above mouth of the river. Finding the stream in good navigable condition above Wright Ferry to Point Jefferson, the party then worked downstream to the mouth, which was reached November 27, 1909. The following is a summary of the work performed:

Channel snags cut and destroyed	5, 830
Shore snags cut and destroyed	1, 585
Logs removed from channel	1, 340
Logs cut up along banks	1, 487
Side jam broken up and destroyed	1
Trees removed from channel	104
Leaning trees felled and cut up	1, 309

With reference to the outlet of Boeuf River near Point Jefferson, La., attention is invited to the Annual Report of the Chief of Engineers for 1907, pages 1502 and 1503. The conditions as there stated still exist at this locality, and the necessity for closing the outlet continues. In case this work is not undertaken by the Louisiana state authorities, the recommendation for an appropriation of $30,000 is renewed.

(C) TENSAS RIVER AND BAYOU MACON.

After suspending work in Boeuf River, quarter boat *No. 3* was transferred to Tensas River, where operations were resumed December 1, 1909, were carried upstream 42.7 miles to the mouth of Bayou Macon, then up Bayou Macon 111.6 miles to Floyd, and back to Clayton at the crossing of the New Orleans and Northwestern Railroad, on Tensas River, 27.3 miles above its mouth, where work was suspended by high water January 29, 1910. The following is a summary of the work performed:

Channel snags cut and destroyed	1, 113
Shore snags cut and destroyed	732
Logs removed from channel	901
Logs cut up along banks	221
Trees removed from channel	7
Leaning trees felled and cut up	782
Square yards of willows and brush cut	7, 900

(D) BAYOUS D'ARBONNE AND CORNEY.

No work was performed in bayous D'Arbonne and Corney during the fiscal year, the available plant having been employed elsewhere during the period of low water.

Preparations were in progress June 30, 1910, to resume work early in July if the water receded to a favorable stage for effective operations.

In my opinion these tributaries of Ouachita River are worthy of further improvement to the extent of maintaining navigation during high water by snagging, etc.

No estimate is made for additional funds, as it is believed that the unexpended balance will be sufficient for maintenance to June 30, 1912.

APPROPRIATIONS.

Appropriations have been as follows:

By act of—	Bayou Bartholomew.	Boeuf River.	Tensas River and Bayou Maçon.	Bayous. D'Arbonne and Corney.	Total.
March 3, 1881	$8,000	$5,000	$3,000	....	$16,000
August 2, 1882	5,000	5,000	....	....	10,000
July 5, 1884	5,000	5,000	4,000	$5,000	19,000
August 5, 1886	5,000	5,000	4,000	2,000	16,000
August 11, 1888	5,000	6,000	5,000	2,000	18,000
September 19, 1890	5,000	5,000	5,000	2,000	17,000
July 13, 1892	5,000	10,000	5,000	4,000	24,000
August 18, 1894	5,000	8,000	5,000	[a] 2,000	20,000
June 3, 1896	4,000	6,000	5,000	....	15,000
March 3, 1899	5,000	6,000	4,000	....	15,000
June 13, 1902 (allotments July 26, 1902) [b]	5,000	3,500	4,000	2,500	15,000
March 3, 1905 (allotments April 7, 1905) [c]	5,000	900	9,500	1,600	17,000
March 2, 1907 (allotments March 20, 1907)	5,000	5,000	5,000	2,000	17,000
March 3, 1909 (allotments April 6, 1909)	4,000	4,000	5,000	2,000	15,000
June 25, 1910 (allotments)	5,000	2,500	6,000	2,500	16,000
Total	76,000	76,900	69,500	27,600	250,000

[a] Act of August 18, 1894, also appropriated $1,000 for Little D'Arbonne.

[b] The original allotments of appropriations of June 13, 1902, authorized July 26, 1902, were $5,000 for Boeuf River and $2,500 for Tensas River and Bayou Maçon. October 23, 1903, a transfer of $1,500 from Boeuf River to Tensas River and Bayou Maçon was authorized.

[c] The original allotments of appropriation of March 3, 1905, authorized April 7, 1905, were $5,000 for Boeuf River, $5,000 for Tensas River and Bayou Maçon, and $2,000 for Bayous D'Arbonne and Corney. January 4, 1906, a transfer of $3,700 from Boeuf River to Tensas River and Bayou Maçon was authorized, and December 8, 1906, transfers of $400 from Boeuf River and $400 from Bayous D'Arbonne and Corney to Tensas River and Bayou Maçon were authorized.

Receipts from sales:

Boeuf River	$27.75
Tensas River and Bayou Maçon	27.75

COMMERCIAL STATISTICS, YEAR ENDING JUNE 30, 1910.

BAYOU BARTHOLOMEW.

No report received. Boat withdrawn.

BOEUF RIVER, LOUISIANA.

Season of navigation.—Opened December 19, 1909; closed June 30, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered steamers	3	119
Unregistered:		
Barges	2	
Rafts	2	
Total	7	119

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	35 bales	11	$3,300	90	$0.0123
Cotton seed	1,800 sacks	112	2,800	90	(a)
Hides and skins	25 bundles	1	400	90	(a)
Live stock	316 head	83	7,980	90	.0074
Staves	230,000	2,875	34,500	100	(a)
Provisions	600 packages	45	3,035	90	(a)
Grain	75 sacks	6	190		(a)
Saw logs	20,000 feet b. m	50	100	90	(a)
Miscellaneous	100 packages	8	500		
Total		3,191	52,805		

[a] Not obtainable.

TENSAS RIVER AND BAYOU MACON, LA.

Season of navigation.—Opened December 19, 1909; closed June 30, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	4	272	190
Unregistered:			
Steamers	5		800
Barges	3		
Rafts	1		
Total	13	272	990

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	2,062 bales	619	$185,580	66	$0.0138
Cotton seed	11,966 sacks	1,373	34,317	63	.0063
Hides and skins	20 bundles	1	400	71	(a)
Live stock	126 head	63	3,730	68	(a)
Lumber	81,000 feet b. m.	203	2,030	67	(a)
Staves	43,492	544	6,528	70	(a)
Provisions	9,400 packages	705	50,335	68	(a)
Grain	8,597 sacks	638	19,937	57	(a)
Saw logs	250,000 feet b. m.	1,000	2,000	75	(a)
Rice	25 sacks	1	62	20	(a)
Hay		7	140	10	(a)
Miscellaneous	3,000 packages	230	18,665	65	(a)
Total		5,384	$323,724		

[a] Not obtainable.

BAYOUS D'ARBONNE AND CORNEY, LOUISIANA.

Season of navigation.—Opened December 15, 1909; closed June 30, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered steamers	2	40
Unregistered rafts	3	
Total	5	40

Freight traffic.

Article.	Amount.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Saw logs	350,000 feet b. m.	1,400	$2,800	10	$0.002
Miscellaneous		1,600	106,000	45	(a)
Total		3,000	108,800		

[a] Not obtainable.

V 6.

IMPROVEMENT OF MOUTH OF YAZOO RIVER AND HARBOR AT VICKSBURG, MISSISSIPPI.

Work for the maintenance of West Pass levee was continued. This included grading and paving with rock, enlarging levee, cutting weeds, building a fence across the levee, planting some willows at the lower end, clearing drift during high water, repairing rain wash, sodding, and renewing brush dikes to prevent scour during high water.

The work of grading and paving the lake side of the levee, suspended June 12, 1909, was resumed in October and completed in December, 1909. The following is a statement of the quantities and cost of this work:

Items.	Quantities.	Cost.	Cost per unit.
Rock and spalls on barges at levee	7,081 cubic yards	$15,585.28	$2,201
Unloading rock and spalls	7,081 cubic yards	319.69	0.045
Spreading spalls and laying rock	7,081 cubic yards 2,752 squares	1,900.69	.268 .691
Fleet work		99.38	
Total riprapping	7,081 cubic yards 2,752 squares	17,905.04	2.528 6.506
Taking down bulkheads	32,070 linear feet	533.98	.017
Grading levee	5,075 squares	983.15	.194
Sodding levee	2,323 squares	57.50	.025
Total cost of improvement		19,479.67	
Cost to June 30, 1909		18,027.64	
Added during past year		1,452.03	

A contract dated November 24, 1909, was entered into with H. F. Garbish, of Vicksburg, Miss., for the enlargement of stations 43 to 48 and topping of stations 48–55, 71–72, and 78–82, at 33 cents per cubic yard. The actual quantities in this work were: 5,074 cubic yards of enlargement and 815 cubic yards of topping, or a total of 5,889 cubic yards, at 33 cents per cubic yard, $1,943.37.

This work was commenced November 29, 1909, and completed January 12, 1910. The enlargement was on the lake side of the levee, and extended upstream from the upper end of the paving. It flattened the slope on this 500 feet of levee to 1 on 4, which was done on account of the exposure of this part to the danger of being wave washed. The topping was placed on the lowest places, being in all cases on parts of the levee where the lake-side slope has been riprapped.

The steamer *Buck Elk* sank in Vicksburg Harbor, about opposite the foot of Grove street, during a storm the night of September 20–21, 1909. The wreck was removed by the U. S. snag boat *J. N. Macomb* October 11, with exception of the boilers, which were removed by the U. S. snag boat *H. G. Wright* early in December, 1909.

From October 11 to 16 a survey was made of the Yazoo diversion canal from the wrong end of Old River to the Mississippi. The canal was sounded at about 1,000-foot intervals, using the ranges employed in former surveys. Wye levels were run to water surfaces at intervals in Old River and the main cut of canal, but in the harbor division water-surface elevations were obtained from the readings of the Kleinston gauge at mouth of canal.

January 19 to 21 a survey was made of the left bank of the Mississippi River fronting the West Pass levee, beginning at the mouth of the Yazoo diversion canal and extending about 1 mile up the river. The five ranges sounded were spaced about 1,000 feet apart and coincided with those used in former surveys of this stretch. Soundings were carried out to channel line of river, and were located by two transits. In connection with this survey there were run out by stadia 2,500 feet of shore line on the Mississippi and 500 on the right bank of canal, at mouth.

January 25 to 27 a survey was made of the east branch of Lake Centennial from deep water in the lake southward to a point about 700 feet below the head of the harbor division of the canal, as dredged in 1902. The four ranges sounded were about 500 feet apart and soundings were located by two transits.

Semiweekly readings of slope gauges along the canal were continued during the year, and June 1 to July 1, 1909, daily readings were made of gauges located on lake and river sides of West Pass levee.

The October, 1909, survey of canal, when compared with that of October, 1908, shows a moderate bottom scour in the dredged cut located in Old River. Of the 20 cross sections taken in the main cut, 6 show bottom scour, 10 show a fill, and 4 indicate no change. A fill is shown throughout the harbor division of the canal ranging from 4 feet at the mouth of Glass Bayou to 0.5 foot at mouth of canal, with an average value of 2.5 feet. The Old River cut, except about 400 feet at upper end, averages 2.5 feet below the original canal grade for this stretch. The main cut averages 18.5 feet below grade from its head at Old River to the lower end of Barnett Lake, the remainder of this stretch ranging from a maximum of 8.5 feet to a minimum of 0 foot below grade, with an average of 4.5 feet below. The harbor division from upper limit of the Vicksburg Harbor to mouth of the canal averages 11 feet below grade, with maximum and minimum values of 13.5 feet and 7.5 feet, respectively, the last named limit corresponding to a water depth of 13.7 feet for a zero stage on the Kleinston gauge.

The canal bottom rises above grade in three places, as follows: (*a*) A stretch of 2,000 feet in Old River averaging about 2.5 feet above grade, with a maximum rise of 5 feet above. The greater part of this stretch lies beyond the limits of the dredged canal. The minimum water depth in this stretch at low-water stage in Old River is about 2 feet. (*b*) A bar of limited extent at the point of debouchment of the main cut into Lake Centennial, and (*c*) a stretch of about 2,000 feet at the upper end of the harbor division of the canal, reaching from deep water in the east branch of Lake Centennial to and a little below the mouth of Glass Bayou. The maximum rise above grade is 2.5 feet, with an average value of 1 foot above. During October and November the Yazoo boats had some difficulty in getting over the first of the stretches named above.

The survey shows no marked changes in canal width, the banks are stable, with a good slope in the general case, and no slips of importance have occurred during the period covered by this report.

The fall in water surface through the canal, Old River to the Mississippi, ranged from zero on December 14 to 4.1 feet on January 8, and averaged 0.9 foot for the period covered by this report. Values as small as 0.2 foot occurred in every month except June, September, October, and February.

A comparison of the surveys of the West Pass levee front made in October, 1908, and January, 1910, indicates the following changes: At the upper limit of survey, 4,600 feet above mouth of canal, there has been a fill of 15 feet over the low bar at the left bank of the

Mississippi, but the outer edge of the bar, below —10 feet on the Kleinston gauge, has scoured back about 15 feet. At 3,600 feet above mouth of the canal a light fill is indicated on the bar, the outer edge of which has advanced (into river) about 40 feet. At the 2,600-foot point the bank has advanced about 40 feet. At the 1,600-foot point the bank has advanced slightly, down to —25 feet on the gauge, being practically unchanged below that elevation. At 500 feet above mouth of the canal the bank has receded about 40 feet, down to —17 feet on the gauge, and about 10 feet at the lower contours. From the last-named point to mouth of canal slow caving is in progress. The slope of this stretch of bank, from —45 feet to 25 feet on the gauge, is slightly steeper than 1 on 3, while above the 25-foot contour the bank is vertical.

The total recession of the Mississippi bank immediately above the mouth of canal since 1902 is about 100 feet at the low-water contour, and the least distance of the bank from the West Pass levee is at present 400 feet.

SUMMARY OF COST.

Services	$1, 641. 69
Material	1. 45
	1, 643. 14

No estimate is made for additional funds, as it is believed that the unexpended balance will be sufficient for maintenance to June 30, 1912.

APPROPRIATIONS.

PREVIOUS PROJECTS.

[Harbor and Mississippi River at Vicksburg, Miss., and revetment work at Delta Point, La.]

June 18, 1878	$84, 000. 00
March 3, 1879	50, 000. 00
June 14, 1880	20, 000. 00
March 3, 1881	75, 000. 00
Allotments by Mississippi River Commission	603, 210. 85
	832, 210. 85

(These items are not given separately in H. Doc. No. 421, 57th Cong., 2d sess.)

Expended for work at—	
Vicksburg Harbor	$442, 724. 77
Delta Point	389, 486. 08
	832, 210. 85

EXISTING PROJECT.

July 13, 1892	$75, 000. 00
August 18, 1894	225, 000. 00
August 18, 1894	40, 000. 00
June 4, 1897	350, 000. 00
March 3, 1901	510, 000. 00
March 3, 1909 (allotment Mar. 29, 1909)	44, 000. 00
June 25, 1910	4, 000. 00
Total	1, 248, 000. 00

V 7.

IMPROVEMENT OF YAZOO, TALLAHATCHIE, COLDWATER, AND BIG SUNFLOWER RIVERS, TCHULA LAKE, STEELE AND WASHINGTON BAYOUS AND LAKE WASHINGTON, AND BEAR CREEK, MISSISSIPPI.

Operations for maintenance of the improvement of Yazoo River and tributaries were continued during the fiscal year ending June 30, 1910, under the local supervision of Mr. H. M. Marshall, assistant engineer, as follows:

(A) YAZOO RIVER.

The United States snag boat *Ben Humphreys*, J. H. Bobbs, master, was employed in Yazoo River from July 19 to August 25, 1909, dredging at McCormick Bar and at the bar below Greenwood, building a brush dike at McCormick bar to direct the flow into the dredged cut, and felling leaning timber in the bend above that locality, the following being a summary of the work performed:

Cubic yards of material dredged from channel at McCormick bar	7,800
Cubic yards of material dredged from channel through bar ½ mile below bridge at Greenwood	1,350
Brush wing dam (350 feet long) built at McCormick bar	1
Leaning trees felled	2,625

The trees felled were used in building the wing dam.

Upon completion of this work the *Humphreys* was sent to Big Sunflower River. After suspension of operations in that stream, the *Humphreys* worked in Yazoo River January 27–31 and removed a large elm tree that obstructed the channel at Holly Bend and four trees and a side jam from the channel below Satartia. On account of high water, the boat was laid up at Vicksburg January 31, 1910, where necessary repairs have been made since that date.

A party, equipped with tools, tackle, and explosives, on United States quarter boat *No. 11*, under Overseer Daniel B. Nailer, commenced work in Yazoo River October 1 at the head of Honey Island and continued downstream to Annadale (estimated distance about 130 miles) where operations were discontinued on account of a rise of the river December 23, 1909. The following is a summary of the work done by this party:

Channel snags destroyed	1,183
Shore snags cut	3,560
Leaning trees felled and cut up	7,761

The party on U. S. quarter boat *No. 2* and derrick boat, under Overseer James N. Ferguson, which had been employed in Tallahatchie River, continued downstream December 1 to 18, 1909, in Yazoo River from its head to a point 1 mile below Silver City (estimated distance about 92 miles) and performed the following work:

Snags pulled and destroyed	152
Stumps cut and destroyed	27
Shore snags cut	129
Logs cut up along banks	67
Leaning trees felled and cut up	161

(B) TALLAHATCHIE AND COLDWATER RIVERS.

Work in Coldwater River of the force of laborers upon U. S. quarter boat *No. 2* and derrick boat, under Overseer James N. Ferguson, in progress June 30, 1909 (see Report, Chief of Engineers, 1909, p. 1567), was continued from July 1 to November 30, 1909, and extended from Yazoo Pass down Coldwater River to its mouth and then down Tallahatchie River to its mouth. The following is a summary of what was done:

Snags pulled and destroyed	3,729
Stumps cut	3,089
Shore snags cut	490
Logs cut up along banks	1,455
Trees removed from channel	24
Side jam broken up and destroyed	1
Leaning trees felled and cut up	8,560
Square yards of willows and brush cut	39,875

(C) TALLAHATCHIE RIVER, BETWEEN BATESVILLE AND THE MOUTH OF COLDWATER RIVER.

In March, 1910, U. S. quarter boat *No. 2* and the derrick boat were towed to the mouth of Coldwater River, and in April and May they were cordeled up Tallahatchie River to Batesville, where supplies were delivered and preparations made to resume operations as soon as the river reached a low stage, favorable for effective work.

Work, under Overseer James N. Ferguson, was resumed June 25, and on June 30, 1910, had been carried downstream about 5 miles, and the following obstruetions were removed:

Stumps destroyed	10
Logs destroyed	48

The logs were chiefly trees that had caved into the channel, some of which stretched entirely across the river.

(D) BIG SUNFLOWER RIVER.

In connection with the closure of chutes in lower Big Sunflower River it was found advisable to build a levee extension of the Little Sunflower dike in Sharkey County, and the work was let to Morrison Brothers by contract dated August 23 and approved September 3, 1909, at 25.45 cents per cubic yard. The contractors commenced operations August 23, 1909, which were completed January 28, 1910; a total of 35,178 cubic yards of levee embankment having been constructed. The dike was extended downstream 3,300 feet by this work.

The U. S. snag boat *Ben Humphreys*, J. H. Bobbs, master, was transferred from the Yazoo to the Big Sunflower River in August, 1909, to deepen the channel by dredging at Oliphant Bar, which is a succession of shoals, beginning at the mouth of the river and extending upstream about 15 miles. Active operations commenced at Upper Kearney August 31 and were continued upstream into the lower end of Mabin Chute, where work was suspended on account of high water January 26, 1910.

At Upper Kearney crossing a channel was dredged about 1,300 feet long, 60 feet wide, and 5 feet deep, from which 5,700 cubic yards of material were removed. Brush dikes were built at this locality to keep the spoil from running back into the cut.

In the bend below Kansas a similar cut was made, about 1,000 feet long, from which 7,700 cubic yards of material were removed, and the crossings in front of Kansas were deepened to permit passage of vessels drawing 4½ feet, about 3,500 cubic yards of material having been removed.

At Fairview a cut 1,600 feet long was made, from which about 7,700 cubic yards of material were removed.

At upper end of Eighteen Mile Island a cut 850 feet long was made, from which about 3,100 cubic yards were removed.

In Mabin Chute a cut 525 feet long was made in hard sand, requiring the removal of about 4,000 cubic yards of material. Progress was slow on account of the difficult material at this locality, and the orange-peel bucket was badly worn by the work.

Summary.

Item.	Locality.	Length of cut.	Bucket measurement.	Place measurement.
		Feet.	*Cu. yards.*	*Cu. yards.*
1	Upper Kearney	1,300	6,875	5,700
2	Bend below Kansas	1,000	10,625	7,700
3	Kansas Crossing	....	4,775	3,500
4	Fairview	1,600	10,615	7,700
5	Eighteen-mile Island	850	4,250	3,100
6	Mabin Chute	525	5,525	4,000
	Total	5,275	42,665	31,700

The place measurement for items 1 and 2 was derived from cross sections made before and after the work was performed. Items 3 to 6 were not cross sectioned, and the place measurement is estimated upon the relation of items 1 and 2 to the bucket measurement.

A derrick boat, for use in Big Sunflower River, built at Vicksburg, was completed October 7, 1909, and was towed to Spanish Fort, near the foot of Oliphant bar, October 8. This boat with a force of laborers under Overseer John W. Kline, jr., worked upstream to Baird, near the crossing of the Southern Railway, where operations were suspended by high water January 31, 1910. The following is a summary of the work performed:

Wing dams built	6
Wing dams repaired	7
Old wing dams removed (at Mabin Island)	4
Stumps pulled, cut, and destroyed	398
Shore snags cut	753
Logs removed from channel	393
Side jams broken up and destroyed	2
Leaning trees felled and cut up	317
Piles cut off in connection with dredging	130

(E) TCHULA LAKE.

A force of laborers, equipped with tools, tackle, and explosives, upon U. S. quarter boat *No. 11*, under Overseer Daniel B. Nailer, commenced work July 21, 1909, at mouth of the lake and continued upstream about 26 miles to the mouth of Black Creek, where work was suspended August 26, 1909, the stage being too low to move the quarter boat farther upstream. The following is a summary of the work performed:

Channel snags pulled and destroyed	254
Stumps cut	560
Shore snags cut	448
Leaning trees felled and cut up	1,308
Square yards of willows and brush cut	107,400

In my opinion Yazoo River and its tributaries are worthy of further work for maintenance and a continuance and extension of the benefits accomplished by what has been performed.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a][b] $12,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

By act of—	Yazoo River.	Tallahatchie and Coldwater rivers.	Big Sunflower River.	Tchula Lake.	Steele Bayou, etc.	Bear Creek.	Total.
March 3, 1873	$40,000.00						$40,000.00
March 3, 1875	12,000.00						12,000.00
August 14, 1876	15,000.00						15,000.00
June 18, 1878	25,000.00						25,000.00
March 3, 1879	15,000.00	$13,000.00	$20,000.00				48,000.00
June 14, 1880	12,000.00	13,000.00	8,000.00				33,000.00
March 3, 1881	6,000.00	3,000.00	4,000.00	$3,000.00			16,000.00
August 2, 1882	8,000.00	3,000.00	5,000.00	2,500.00			18,500.00
July 5, 1884	10,000.00	3,000.00	5,000.00	1,500.00	$2,500.00		22,000.00
August 5, 1886	15,000.00	3,500.00	5,000.00	2,000.00	2,500.00		28,000.00
August 11, 1888	32,000.00	5,000.00	5,000.00	3,000.00	2,500.00		47,500.00
September 19, 1890	25,000.00	5,000.00	5,000.00	3,000.00	2,500.00		40,500.00
July 13, 1892	20,000.00	5,000.00	5,000.00	3,000.00	2,500.00		35,500.00
August 18, 1894	20,000.00	4,000.00	5,000.00	3,000.00			32,000.00
June 3, 1896	20,000.00	4,000.00	5,000.00				29,000.00
March 3, 1899	20,000.00	5,000.00	5,000.00				30,000.00
June 13, 1902 (allotments July 30, 1902)	21,000.00	10,000.00	20,000.00	4,000.00			55,000.00
March 3, 1905 (allotments Apr. 7, 1905)[a]	78,000.00	10,000.00	13,000.00	4,000.00			105,000.00
March 2, 1907[b]	34,500.00	10,500.00	100,000.00	4,000.00			149,000.00
March 3, 1909 (allotment Apr. 6, 1909)	10,000.00	15,000.00		5,000.00			30,000.00
June 25, 1910 (allotment)	16,000.00	5,000.00	10,000.00		5,000.00	$3,000.00	39,000.00
Total	454,500.00	117,000.00	220,000.00	38,000.00	17,500.00	3,000.00	850,000.00

[a] The original allotments of appropriation of March 3, 1905, authorized April 7, 1905, were $90,000 for Yazoo River and snag boat and $5,000 for Tallahatchie and Coldwater rivers. July 12, 1906, a transfer of $5,000 from Yazoo River to Tallahatchie and Coldwater rivers was authorized. A transfer of $7,000 from Yazoo River to Big Sunflower River was authorized December 23, 1909.

[b] The river and harbor act of March 2, 1907, made specific appropriation of $100,000 for Big Sunflower River and $4,000 for Tallahatchie River above mouth of Coldwater River to Batesville. The following allotments for maintenance were authorized March 20, 1907: Yazoo River, $36,000; Tallahatchie and Coldwater rivers, $5,000; and Tchula Lake, $4,000. A transfer of $1,500 from Yazoo River to Tallahatchie and Coldwater rivers was authorized December 23, 1908.

Receipts from sales:

Yazoo River	$265.76
Tallahatchie and Coldwater rivers	40.00

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[a] To be applied to continuing the removal of snags, leaning trees, etc., dredging bars, and building contraction dikes.

[b] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS, YEAR ENDING JUNE 30, 1910.

YAZOO RIVER, MISSISSIPPI.

Season of navigation.—Opened July 1, 1909; closed May 31, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered steamers	11	681	3,500
Unregistered:			
Steamers	1		
Barges	30		
Rafts	48		
Total	90	681	3,500

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	12,320 bales	3,696	$1,108,800	175	$0.0277
Cotton seed	152,617 sacks	9,587	239,675	100	.0171
Seed cotton	305 sacks	30	3,840	100	
Hides and skins	150 bundles	7	2,800	175	([a])
Live stock	175 head	88	5,280	175	.0286
Lumber	1,738,000 board feet	4,345	43,450	60	.0114
Staves	120,000	1,500	18,000	150	([a])
Provisions	75,900 packages	5,692	379,466	175	.0228
Grain	112,564 sacks	9,505	297,026	175	.0171
Saw logs	23,929,000 board feet	95,212	190,450	45	.0020
Sand and gravel	9,200 cubic yards	1,400	1,400	52	.0028
Coal		15,000	60,000	5	
Brick	50,000	100	350	175	.0142
Miscellaneous	80,184 packages	6,358	409,867	160	.0439
Total		152,520	2,760,404		

[a] Not obtainable.

TALLAHATCHIE AND COLDWATER RIVER, MISSISSIPPI.

Season of navigation.—Opened July 1, 1909; closed May 31, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered, steamers	3	284
Unregistered:		
Barges	3	
Rafts	15	
Total	21	284

Freight traffic.

Article.	Amount.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	17,367 bales	5,211	$1,563,300	65	(a)
Cotton seed	244,772 sacks	15,298	382,450	60	$0.0125
Hides and skins	1,900 bundles	95	38,000	55	(a)
Live stock	350 head	175	10,500	65	.0250
Lumber	1,055,000 board feet	2,638	26,380	63	.0083
Staves	50,000	625	7,500	65	(a)
Provisions	2,500 packages	188	12,535	30	.0144
Grain	1,058 sacks	85	2,655	30	.0125
Saw logs	4,647,000 board feet	18,588	37,176	40	.0029
Miscellaneous	95,000 packages	7,373	491,535	62	.0368
Total		50,276	2,572,031		

[a] Not obtainable.

BIG SUNFLOWER RIVER, MISSISSIPPI.

Season of navigation.—Opened July 1, 1909; closed May 31, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered: Steamers	5	379	1,155
Unregistered:			
Steamers	1		
Barges	12		
Rafts	20		
Total	38	379	1,155

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	15,418 bales	4,825	$1,387,500	65	$0.0370
Seed cotton	9,000 sacks	900	115,200	65	(a)
Cotton seed	58,129 sacks	3,633	90,825	65	.0274
Hides and skins	375 bundles	19	7,600	65	(a)
Live stock	650 head	325	19,500	65	.0458
Lumber	658,000 board feet	1,645	16,450	65	.0182
Staves	10,000	125	1,500	65	(a)
Provisions	11,900 packages	892	59,435	65	.0365
Grain	66,580 sacks	5,026	157,063	65	.0274
Saw logs	15,010,000 board feet	60,040	120,080	50	.0029
Wood	250 cords	400	800	65	(a)
Brick	50,000	125	465	65	.0227
Miscellaneous	21,780 packages	1,933	116,865	60	.0702
Total		79,888	2,093,283		

[a] Not obtainable.

TCHULA LAKE, MISS.

Season of navigation.—Opened December 1, 1909; closed May 31, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered: Steamers	1	18

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Cotton	533 bales	160	$48,000	70	(a)
Cotton seed	4,000 sacks	250	6,250	70	(a)
Provisions		100	6,666	70	(a)
Grain		50	1,563	70	(a)
Total		560	62,479		

[a] Transported by owners.

COMMERCIAL STATISTICS.

STEELE BAYOU, MISSISSIPPI.

Season of navigation.—Opened January 24, 1910; closed June 30, 1910.

Vessel classification.

Class.	American.	Net registered tonnage.
Registered, steamers	1	11
Unregistered:		
Steamers	3	
Barges	5	
Rafts	3	
Total	12	11

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.
Cotton	325 bales	98	$29,400
Cotton seed	17,800 sacks	1,113	27,825
Live stock	50 head	25	1,500
Lumber	2,800,000 board feet	7,000	70,000
Provisions	400 packages	30	2,000
Grain	1,500 sacks	120	3,750
Saw logs	740,000 board feet	2,960	5,920
Miscellaneous		302	20,130
Total		11,648	160,525

Average haul or distance freight was carried and rate per ton-mile not obtainable.

BEAR CREEK, MISSISSIPPI.

Season of navigation.—Opened January 24, 1910; closed March 30, 1910.

Vessel classification.

Two unregistered American barges.

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.
				Miles.
Cotton seed	190 sacks	12	$300	18
Provisions		350	23,335	18
Total		362	23,635	

Rate per ton-mile not obtainable.

APPENDIX W.

IMPROVEMENT OF RIVERS AND HARBORS IN THE LITTLE ROCK, ARKANSAS, DISTRICT.

REPORT OF MAJ. M. L. WALKER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Arkansas River, Arkansas.
2. Arkansas River, Arkansas (dredging).
3. Arkansas River at Pine Bluff and White River at Augusta Narrows, Arkansas.
4. White River, Arkansas.
5. Arkansas River at Pine Bluff, Arkansas.
6. Upper White River, Arkansas.
7. Operating and care of Locks and Dams Nos. 1, 2, and 3, upper White River, Arkansas.
8. Cache River, Arkansas.
9. Black and Current rivers, Arkansas and Missouri.
10. St. Francis and L'Anguille rivers and Blackfish Bayou, Arkansas.
11. Saline River, Arkansas.

ENGINEER OFFICE, UNITED STATES ARMY,
Little Rock, Ark., July 18, 1910.

SIR: I have the honor to forward herewith annual reports for the fiscal year ending June 30, 1910, * * * for the following-named works of river and harbor improvement; * * *

Very respectfully, your obedient servant,

M. L. WALKER,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

W I.

IMPROVEMENT OF THE ARKANSAS RIVER, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

Snagging operations.—The snag boat *C. B. Reese*, which was working in the vicinity of Douglas Cut-off (60) at the beginning of the fiscal year, continued operations in the river below Rob Roy Bridge (98) until October 1, 1909, when it was transferred to White River.

It returned to this river (Arkansas) November 16, 1909, and worked between the mouth of the river and Rob Roy Bridge until January 10, 1910, when operations were suspended at Swan Lake (80) on account of continued inclement weather. The boat lay at Swan Lake until January 20, 1910, waiting a rise in the river sufficient to let it pass through Rob Roy Bridge (98). On that date the boat ran up to Pine Bluff (107) and annual repairs were begun. The capstan machinery was overhauled and new parts placed where needed, the principal item being one new master wheel; the feed-water heater was dismantled, fitted with new shell, and reinstalled; all pumps were overhauled and fitted with new parts where needed; main boilers were scaled and a new forward mud drum placed; the auxiliary boiler was taken down, fitted with new ash pan and chute, and then reset; some minor repairs were made to upper works and the paddle wheel. The boat was placed in commission again on April 12, 1910. It worked from Pine Bluff (107) to Little Rock (174), then went to the river below Rob Roy Bridge (98). At the close of the year the boat is working in the vicinity of Red Fork (25).

The snag boat *Arkansas* was working in the vicinity of Spadra (290) at the beginning of the fiscal year. It worked between that place and Rob Roy Bridge (98) until October 1, when it went below. Because of the channel through the draw openings of the bridge being too shoal for boats, the *Arkansas* passed under the fixed spans of the bridge. To do this it was necessary to lower the "A" frame and the chimneys and to remove the flagstaffs, whistle, and stovepipes. These were replaced and the boat resumed operations on October 4. From October 25 to November 3 the boat lay at Brunsons (88) awaiting a rise in the river sufficient to permit it to pass over Richland shoal. On November 16 the boat was transferred to White River. It returned to this river (Arkansas) on December 21 and worked in the lower reaches until January 10, when operations were suspended at Swan Lake (80) on account of continued inclement weather. It lay there until January 20, when it was run to Pine Bluff (107) and repairs begun. The refrigerating plant was overhauled, a new lining and a new top made for the freezing tank, the old sheet-iron floor of the chilling room was torn out and a new one placed; the cylinders of the ammonia compressor were dressed out and the pistons fitted with new rings, new rods, and brasses; the furnace for the main boilers was repaired and fitted with new grate bars, liners, and fire shields; new piston rings were fitted to both propelling engines; the cam yokes were refaced and refitted; the stacks were taken down and reriveted; breeching taken down and two stub rings and elbow sheet on both sides were renewed; new pitman placed for starboard engine; new nosing placed all around hull; and the paddle wheel rebuilt. The boat was placed in commission again May 13, 1910, and began snagging operations at Spadra (290) May 23, 1910. It worked up to Ozark (318) and back to Little Rock, where it was laid up June 15, 1910, pending the action of Congress on the new river and harbor act. At the close of the year the boat is in ordinary at Little Rock (174).

Summary of snagging operations in Arkansas River, fiscal year 1910.

Date.	Snag boat.	Work done between—	Distance (miles).	Snags removed.	Trees cut.	Drifts broken.	Miles run.
1909.							
July	C. B. Reese	Hopedale and Swan Lake	62	156	1,706		206
Do	Arkansas	Little Rock and Spadra	116	234	413	2	265
August	C. B. Reese	Poverty Point and Rob Roy	90	265	32		186
Do	Arkansas	Pitts Point and Little Maumelle.	79	278	661		211
September	C. B. Reese	Medford and South Bend	23	171	1,240	1	83
Do	Arkansas	Rob Roy and Pine Bluff	9	131	778	1	32
October	do	Brunsons and Pine Bluff	19	206	436		37
November	C. B. Reese	Poverty Point and Medford	21	99	1,857		67
Do	Arkansas	Poverty Point and Bickers Bend.	48	78	30		115
December	C. B. Reese	Poverty Point and Bankhead.	77	117	2,928		311
Do	Arkansas	Poverty Point and South Bend	44	40	1,515		72
1910.							
January	C. B. Reese	Hannaberry and Swan Lake	12	31	302		55
Do	Arkansas	Dulin Bend and Swan Lake	32	27			92
April	C. B. Reese	Jenkins Place and Little Rock.	72	55	2,421		155
May	do	South Bend and White Bluff	78	10	4,612		121
Do	Arkansas	Howells and Ozark	63	36	99	1	284
June	C. B. Reese	Poverty Point and Rob Roy	90	103	4,622		391
Do	Arkansas	Devils Bend and Shoal Creek	95	81	717		201
		Total Poverty Point and Ozark	310	2,118	24,369	5	2,884

Channel at Rob Roy Bridge.—The channel of the river having left the draw openings of the St. Louis Southwestern Railway bridge over the river at Rob Roy, the railway company began reconstructing the bridge on September 6, 1909, on plans approved by the Secretary of War August 3, 1909. When the reconstruction is completed the bridge will be fitted with two swing draws. In the meanwhile the bridge obstructs the larger boats when the river is below 11.5 to 12.5 feet on Pine Bluff gauge, and is the cause of serious interruptions of commerce between Little Rock and Pine Bluff and Mississippi River points. At the close of the year the new piers have been completed and work is in progress on the new south abutment.

Remarks on low water.—The gauge records for the low-water period of this fiscal year show a slight lowering of the low-water plane at Little Rock and a very remarkable rise in the low-water plane at Pine Bluff. The table below shows gauge readings at Fort Smith, Little Rock, and Pine Bluff, and discharge at Little Rock on same dates in this and three other "low-water years."

Date.	Fort Smith gauge.	Little Rock gauge.	Pine Bluff gauge.	Discharge at Little Rock per second.
	Feet.	*Feet.*	*Feet.*	*Cubic feet.*
November 12, 1887	1.1	1.2	0.0	2,639
October 22, 1897	.7	1.3		1,190
October 7, 1901	2.0	1.3	.7	1,388
October 22, 1909	3.0	.4	6.4	2,974

There were no records kept of the Pine Bluff gauge readings during 1897, 1898, or 1899.

The abnormal height at Pine Bluff is due to the filling of the bed just below that place with deposits from the excessive caving in the vicinity of Boyd Point during the last fiscal year.

Private work.—During this fiscal year the Linwood-Auburn levee district, in conjunction with the State of Arkansas and the St. Louis, Iron Mountain and Southern Railway, built 1,960 linear feet of revetment in Cummins Bend (70) for the purpose of protecting the levee there against caving bank. The mattress used—100 feet wide—was of the standard type used in the Arkansas River. The bank was paved with concrete blocks, the mixture being 1 part cement and 6 parts bar sand. The size of the blocks used was 5 inches by 9 inches by 18 inches. They were laid with the 9 by 18 inch face exposed. The cost of the work is given me as $22,126. It has had no high-water test, and at date of last reports was in fine condition.

Also during the year Mr. Harry Keattes and Mr. T. C. Brown made a contract with the River, Rail and Harbor Construction Company of Jackson, Miss., to protect about 1 mile of caving bank along their plantations in Keattes Bend (163) by means of its patented system. At the date of last reports the work was only partially effective.

Condition of works.—The Pine Bluff revetment, having just been rebuilt, is in fine condition. The other works for permanent improvement are practically in the same condition as reported last year under the heading "Permanent works." During this spring there has been an unusually large number of sliding banks in the lower reaches of the river below Red Fork (25).

Of the balance available July 1, 1910, $41,988.23 will be applied to snagging operations and the remainder to repair of Pine Bluff revetment and levee should repairs become necessary. The *Arkansas* has no plant for building and repairing revetments, hence the work—if any should be needed—will have to be done with such barges and boats as can be hired in the vicinity. These are not suited for the work; and if the action of Congress in making the appropriations of March 2, 1907, and March 3, 1909, for restoration of permanent works at Pine Bluff is to be taken as an indication of a desire on its part to maintain such works along this river, it will be necessary to procure and maintain suitable plant for this class of work as well as for the prevention of cut-offs, as explained in last annual report. A suitable plant, if built of wood, will cost about $55,000. The river is worthy of maintenance of channel by snagging operations. As to whether the existing works should be maintained and cut-offs prevented, that is a question for Congress to decide. The amount estimated as being needed for the fiscal year ending June 30, 1912, is based on the assumption that appropriations will be made annually hereafter and is for maintenance of channel by snagging operations and for maintenance of permanent works at Pine Bluff *only.*

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$32,500
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.	

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Many of the early appropriations for this river were combined with those of other rivers, and it is impracticable to make an exact statement of the distribution of the appropriations to this river from the lists given in House Document No. 421, Fifty-seventh Congress, second session. In the Annual Report for 1908 (p. 1590) there is given a list showing a close approximation to all appropriations and allotments for this river. Using that list as a basis, the following list is made:

July 3, 1832, to September 15, 1900, appropriations and allotments	$2, 250, 783. 46
June 13, 1902, continuing improvement and for maintenance, including the general improvement, and removing obstructions and operating snag boats	110, 000. 00
March 3, 1905:	
For maintenance of improvement	35, 000. 00
For revetment work in the vicinity of Red Fork, provided it is required in the interest of navigation	30, 000. 00
March 2, 1907, for maintenance of improvement	35, 000. 00
(And the amounts heretofore appropriated to be expended in the vicinity of Red Fork levee or set apart for dredging are hereby made available for this improvement.)	
March 3, 1909, preservation and maintenance (general)	35, 000. 00
June 25, 1910, for maintenance of improvement, including works at Pine Bluff	51, 000. 00
	2, 546, 783. 46
June 7, 1904, allotted from emergency river and harbor act approved April 28, 1904	20, 000. 00
February 18, 1905, allotted from emergency river and harbor act approved April 28, 1904	[a]501. 41
Total appropriations and allotments	2, 567, 284. 87
Receipts from sales in fiscal year 1907	23. 70
Receipts from sales in fiscal year 1908	9. 00
Total appropriations, allotments, and sales	2, 567, 317. 57

EXPENDITURES.

Old projects:		
Construction of permanent works	$903, 311. 93	
Maintenance of permanent works	314, 119. 14	
Operating snag boats	1, 031, 654. 13	
		2, 249, 085. 20
Consolidated project:		
Maintenance of permanent works	20, 470. 00	
Hydraulic dredging	38, 121. 28	
Operating snag boats	198, 269. 47	
		256, 860. 75
Total expenditure to June 30, 1910		2, 505, 945. 95
Unexpended July 1, 1910		61, 371. 62
		2, 567, 317. 57

COMMERCIAL STATISTICS (YEAR ENDING MAY 31).

No navigation was reported above Webbers Falls, 430 miles above the mouth and 31 miles below Grand River. Navigation out of Fort Smith was suspended on account of shoal water from August 16 to November 19, 1909; out of Little Rock from August 7 to November 19, 1909; and in the lower river between Pendleton and Rob Roy from October 19 to November 10, 1909.

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[a] One thousand dollars less $498.59 not used and returned to Treasury.

List of vessels reporting having navigated Arkansas River from May 31, 1909, to June 1, 1910.

Name.	Net tonnage.	Draft, loaded.		Between—	Round trips.	Passengers.
		Steamer.	Barges.			
		Ft. in.	*Ft. in.*			
Herman Paepcke	157	4 0	6 0	Helena and Maynards	1	....
Rapids	149	4 6	....	Little Rock and Memphis	9	88
				Litte Rock and Dardenelle	1	....
Grand	149	4 6	....	Little Rock and Memphis	2	11
				Little Rock and Dardenelle	14	231
				Little Rock and Cummins	8	75
				Little Rock and Pine Bluff	1	17
				Little Rock and Ozark	1	3
				Little Rock and Littles	1	12
J. N. Harbin	142	4 0	....	Memphis and Hecatoo	1	....
				Memphis and Rob Roy	16	....
				Memphis and Pine Bluff	15	....
				Mouth and Rob Roy	7	....
Hazel Rice	101	3 6	6 0	Helena and Maynards	1	....
Osage	98	3 6	....	Mouth and Rosemary	1	....
A. D. Allen	86	4 0	3 0	Little Rock and Cummins	4	120
				Little Rock and Pine Bluff	18	
				Little Rockand Littles	10	
Mary C. Lucas	52	3 6	3 0	Pine Bluff and Rosedale	9	71
				Pine Bluff and Arkansas Post	14	
				Pine Bluff and Pendleton	10	
				Pine Bluff and Medford	5	
				Pine Bluff and Garland Lake	2	
				Pine Bluff and Plum Bayou	2	
				South Bend and Rosedale	4	
H. C. Brockman	75	4 0	5 0	Arkansas City and Reydells	4	....
Jewel	49	3 6	4 6	Mouth and South Bend	1	....
C. M. Johnson	41	3 6	5 0	Arkansas City and South Bend	8	....
Pilot	9	4 0	....	Pendleton and Garland Lake	1	....
Border City [a]	27	2 6	2 0	Fort Smith and Webbers Falls	58	....
				Fort Smith and Shoal Creek	42	....
America [a]	20	2 0	2 6	Lewisburg and Petit Jean	40	....
Joseph H. [a]	15	4 0	....	Mouth and Arkansas Post	1	....
Chastina [a]	13	2 6	3 2	Little Rock and Waynes	5	....
				Little Rock and Little Maumelle	1	17
				Little Rock and Crystal Hill	1	11
				Little Rock and Browns	2	....
Malone [a]	13	1 2	1 8	Pine Bluff and Plum Bayou	65	....
Hazel McFadden [a]	11	1 0	1 8	....do	20	....
Island Queen [a]	10	3 0	....	Mouth and Garrettsons	42	....
Tiger [a]	10	2 0	2 0	Pine Bluff and Pastoria	10	....
David Neale [a]	6	1 6	2 0	Pine Bluff and Garland Lake	1	....
				Pine Bluff and Pendleton	1	....
				Pine Bluff and Rob Roy	3	....
				Pine Bluff and Little Rock	1	....
Success [a]	6	1 6	....	Greenville and Arkansas Post	12	....

[a] Motor boats, gasoline power. All others steamboats.

Classification of vessels from which reports were received.

Class.	Number.	Net tonnages.	Number of round trips.	Vessel mileage.	Passengers.
Registered:					
Steamers	12	9–157	171	28,218	628
Motor boats	10	6–27	305	29,610	28

NOTE.—No reports were received from unregistered vessels.

Classification of commerce reported, year ending May 31, 1910.

Articles.	Tons.	Articles.	Tons.
Cotton	2,273	Saw logs	34,621
Cotton seed	4,423	Merchandise	5,600
Lumber	5,478	Miscellaneous	387
Staves and bolts	3,939		
Groceries	2,450	Total tonnage reported	62,172
Grain	2,513		
Hay	488	Estimated value	$1,630,338

W 2.

IMPROVEMENT OF THE ARKANSAS RIVER, ARKANSAS (DREDGING PROJECT).

OPERATIONS THIS FISCAL YEAR.

This is a new appropriation title and nothing has been done under it during the fiscal year ending June 30, 1910. The dredging operations during the fiscal years 1907, 1908, and 1909 were done under the general project for improvement of the Arkansas and are reported on under that heading during those years.

This appropriation is based on reports and estimates published in House Documents No. 71, Sixty-first Congress, first session, and No. 510, Sixty-first Congress, second session, and provides for the construction of two self-propelled suction dredges and accessories, and for their operation at points where most needed in the interest of commerce between the mouth of the river and Ozark (318). The estimated cost of the work is $349,000 for plant and $118,700 a year for its operation.

Of the balance available July 1, 1910, approximately $349,000 will be expended in procuring two dredges and accessories, and the balance will be applied to the operation of them. The river is worthy of the expenditure contemplated. The amount estimated as being needed in the fiscal year ending June 30, 1912, is for operation of the dredging plant previously mentioned, and is based on the assumption that appropriations will be made annually hereafter and that the new plant will be available for use in the autumn of 1911. The general project for improving Arkansas River provides for dredging, therefore it is recommended that this work be consolidated with the general improvement work in future river and harbor bills.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

June 25, 1910, for the construction and operation of two dredge boats and accessories	$375,000

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[a] Exclusive of the balance unexpended July 1, 1910.

W 3.

IMPROVEMENT OF ARKANSAS RIVER AT PINE BLUFF AND WHITE RIVER AT AUGUSTA NARROWS, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

Nothing done, the project having been completed last fiscal year. The expenditures this fiscal year were payments of liabilities outstanding at the beginning of the year. No further operations are recommended under this appropriation title.

APPROPRIATIONS.

March 2, 1907, improving Arkansas River at Pine Bluff and White River at Augusta Narrows, Arkansas	$100,000.00
December 21, 1908, allotted from emergency river and harbor acts of 1905 and 1907	20,000.00
	120,000.00
Returned to Treasury	2,043.00
Total appropriations and allotments	117,957.00

EXPENDITURES.

Augusta levee and revetment	$25,781.77
Pine Bluff levee	55,200.00
Pine Bluff revetment	36,927.33
	117,909.10
Outstanding liabilities June 30, 1910	47.90
Total	117,957.00

W 4.

IMPROVEMENT OF ARKANSAS RIVER AT PINE BLUFF, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

This work was that of rebuilding the bank revetment that extended along the town front of Pine Bluff, from Dike No. 3 to Lone Tree Point. It was begun with funds obtained from the appropriation "Arkansas River at Pine Bluff and White River at Augusta Narrows, Arkansas." Working under that appropriation and under this one last fiscal year, 4,100 linear feet of mattress (120 feet wide) were built from State street down to east side of Ohio street, 1,600 feet below Mallorys ditch, and 2,050 linear feet of bank from Tennessee street down to Florida street were graded and paved. During this fiscal year 3,977 linear feet of mattress (120 feet wide) were built from the east side of Ohio street down to Lone Tree Point, the lower end of the mattress being 5,577 feet below Mallorys ditch; a reinforcing or second mattress, 100 feet wide and 1,901 feet long, was placed on top of the 120-foot mattress from Mallorys ditch down to 30 feet above Nebraska street; a mattress 100 feet wide and 920 feet long, beginning at Dike No. 3 and ending at the west side of the county court-house, was placed over the narrow mattress built by local improvement district No. 25 last fiscal year; 2,510 linear feet of bank from Dike No. 3 to Tennessee street was graded and paved from the 6-foot stage to 25-foot stage and 4,800 linear feet of bank from Florida street down to the end of the work was graded and paved from the 6-foot stage to the top of bank, which varies from 30 to 32 feet stage. The total length of the work from Dike No. 3 to the lower end at Lone Tree Point is 9,360 feet. The mattresses were completed December 16, 1909, and the bank paving was completed December 22, 1909.

The plant used on this work and which belongs to upper White River, Arkansas, was held here during the winter and spring awaiting the action of the spring freshets on the work. To the close of the year the following minor repairs have been made:

In February, some paving displaced by wave wash between Court and Nebraska streets was relaid.

In March, holes made in the paved slope below St. Louis Southwestern Railway shops by surface water running over the slope were filled and repaved.

In April, breaks in paving between Dike No. 3 and Tennessee street by wave wash, and below Ohio street by surface wash, were repaired.

In June, breaks in the paving from Dike No. 3 down to Ohio street, due to wave wash in the storm of June 9, were repaired.

Also in May, 800 cubic yards of stone were distributed under water at or near the low-water line along the mattress from Mallorys ditch down to Ohio street, this portion of the work being subjected to the greatest strain during medium and high stages, and being considered the weakest part of the work.

To complete the work the paving all along is to be extended from the 6-foot stage (the lowest this fiscal year) down to low water.

At the close of this fiscal year the plant is in readiness to return to Batesville, and is lying at Pine Bluff awaiting a rise in the river sufficient to permit it to pass through the draw openings of Rob Roy Bridge, 9 miles below Pine Bluff.

Of the balance available July 1, 1910, about $3,750 will be expended in returning the plant to Batesville and in replacing it in good repair. The remainder of the available balance ($10,123.84) will be expended in completing the bank paving as soon as opportunity occurs. No further appropriations are recommended under this title. For commercial statistics and estimate for fiscal year ending June 30, 1912, see Report for "Arkansas River, Arkansas."

APPROPRIATIONS.

March 3, 1909, Arkansas River at Pine Bluff	$97,200.00
Expended to June 30, 1910	80,966.40
Unexpended July 1, 1910	16,233.60

W 5.

IMPROVEMENT OF WHITE RIVER, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

The snag boat *Quapaw* was working at Rutherford Chute (293) at the beginning of this fiscal year. After clearing that chute of snags, the boat ran up to Batesville (302) and towed a derrick boat from there to Arkansas River for use in works at Pine Bluff. The boat returned to Newport (258) on July 13, 1909, then after working over the river up to Elmo (270) was transferred to Current River on the 20th. It was returned to this river—White—October 1, and worked between Jacksonport (264) and Devall Bluff (125) until the close of the season at Newport (258) on December 20, 1909. For the purpose of general repair and rebuilding of the hull the *Quapaw* was sent to docks at Helena, Ark., leaving Newport March 28, 1910, and arriving at Helena April 1, 1910. The boat was not placed on the docks until May 5, 1910. At the close of the year the repairs and rebuilding are about two-thirds completed. The cost of these repairs will be borne by the appropriations for Black and Current rivers, in conjunction with that for White River.

The snag boat *C. B. Reese* was operated in the lower reaches of the river below Devall Bluff (125) from October 1 to November 16, 1909, when it was returned to Arkansas River, exchanging places with the snag boat *Arkansas*. The *Arkansas* worked between the mouth of the river and the mouth of Little Red River (183) until December 21, 1909, when it was returned to Arkansas River.

Summary of snagging operations in White River this fiscal year.

Boat.	Work done between—	Distance (miles).	Snags removed.	Drifts broken.	Trees cut.	Miles run.
Quapaw	Devall Bluff and Rutherford Chute	168	623	60	2.312	1,294
C. B. Reese	Mouth and Devall Bluff	125	298	1	1.520	313
Arkansas	Mouth and Little Red River	183	202	1	1,717	424
	Total mouth to Rutherford Chute	293	1,123	62	5,549	2,031

The balance available July 1, 1910, will be applied to maintenance of channel below Batesville, Ark., by snagging operations. The river is worthy of continuing improvement to that extent. The amount estimated as being needed during the fiscal year ending June 30, 1912, is based on the assumption that appropriations will be made annually hereafter and is for maintenance of plant and for snagging operations, and takes into consideration the probable balance that will be available July 1, 1911.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$18,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Appropriations for this river have been partly for limited reaches, partly for the whole river, and partly for this river in combination with others. The appropriations for this river separately and for reaches of it are as follows:

June 23, 1874, to June 3, 1896, inclusive (see H. Doc. 421, 57th Cong., 2d sess., p. 335)	$366,000.00
March 3, 1899, maintenance below Batesville, Ark	14,815.00
June 13, 1902, maintenance below Batesville, Ark	22,000.00
March 3, 1905, maintenance below Batesville, Ark	15,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

March 2, 1907, maintenance below Batesville, Ark		$30,000.00
March 3, 1909, maintenance below Batesville, Ark		16,000.00
June 25, 1910, maintenance below Batesville, Ark		17,500.00
Total appropriations, June 23, 1874, to June 25, 1910, inclusive		481,315.00
May 31, 1904, allotted from river and harbor act approved June 13, 1902		7,100.00
Receipts from sales in fiscal year 1907	$12.10	
Receipts from sales in fiscal year 1909	17.60	
Receipts from sales in fiscal year 1910	5.05	
		34.75
Total		488,449.75

EXPENDITURES.

On previous projects		$362,801.57
On present projects:		
Augusta	$314.84	
Snagging operations	100,182.84	
		100,497.68
		463,299.25
Unexpended July 1, 1910		25,150.50
		488,449.75

COMMERCIAL STATISTICS.

Between the mouth of the river and Dudleys Dread, 222 miles, the river was navigable all the year for boats of not over 3½ feet draft; between Dudleys Dread and Jacksonport, 42 miles, it was navigable all the year by boats of not over 3 feet draft. Between Jacksonport and Batesville, 38 miles, it was too shoal for navigation by boats of 2 feet draft from August 10 to November 10, 1909.

List of vessels that reported navigating White River during the year ending May 31, 1910.

Name.	Net tonnage.	Draft loaded.				Between—	Round trips.
		Steamer.		Barges.			
		Ft.	*in.*	*Ft.*	*in.*		
Herman Paepcke	157	4	0	6	0	Helena and Clarendon	8
Hazel Rice	101	3	6	6	0	Helena and Seven Mile Bayou	1
Geo. Pope	97	3	0	4	0	Newport and Augusta	2
Maude Kilgore	82	3	0	6	0	Clarendon and Augusta	40
						Clarendon and Mouth	20
Columbia	73	3	0	4	6	Jacksonport and Little Red River	40
Alda	73	3	6	4	6	Clarendon and Log Camps	49
Rock City	64	2	2	4	6	Devall Bluff and Little Red River	45
Jim T. Duffey	57	3	6	7	0	Mouth and Clarendon	4
						Mouth and Taylor Bay	8
Choctaw	44	3	0	4	6	Newport and Humphrey	100
						Newport and Augusta	15
						Newport and Black River	12
Starr	43	2	4	4	0	Newport and Log Camps	81
Pocahontas	35	2	4	4	0	Newport and Rhodes Landing	25
Evening Star	28	5	0	3	0	Rosedale and Indian Bay	47
Mildred	29	3	0	4	6	Devall Bluff and Little Red River	87
Chaney V.[a]	27	3	0	4	0	Rosedale and Webber	52
Joseph H.[a]	15	4	0			Greenville and Webber	1
Leader No. 2[a]	10	2	6	2	10	Newport and Batesville	1
						Newport and Oil Trough	4
						Newport and Black River	25
Forrester[a]	9	3	0	4	6	Clarendon and Jacks Bayou	36

[a] Motor boats, gasoline power. All others, steamboats.

Classification of vessels from which reports were received.

Class.	Number.	Net tonnage.	Number of round trips.	Vessel mileage.
Registered:				
Steamers	13	28-157	584	67,582
Motor boats	4	9-27	119	9,244

NOTE.—Four registered motor boats, 6 to 11 net tons, engaged in general freighting did not make any report. No reports were received from unregistered vessels.

Classification of commerce reported, year ending May 31, 1910.

Articles.	Tons.	Articles.	Tons.
Lumber	22,275	Rough rice	200
Staves	1,847	Miscellaneous	1,217
Saw logs	89,747		
Railway ties	23,730	Total tonnage reported	141,771
Mussel shells	2,755	Estimated value	$619,718

W 6.

IMPROVEMENT OF UPPER WHITE RIVER, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

Nothing done. The expenditures during the year were in payment of liabilities outstanding July 1, 1909. No further appropriations are recommended for this work. The balance on hand July 1, 1910, is being held for use in payment of outstanding liabilities.

APPROPRIATIONS.

March 3, 1899	$160,000.00
June 6, 1900	150,000.00
June 13, 1902	270,000.00
March 3, 1905	160,000.00
March 2, 1907	73,500.00
Total appropriations	813,500.00
Received from sales in fiscal year 1907	1.84
Received from sales in fiscal year 1908	200.00
Received from sales in fiscal year 1909	6.69
Total receipts to June 30, 1910	813,708.53
Unexpended June 30, 1910	442.53
Expended to June 30, 1910	813,266.00

EXPENDITURES.

Lock and Dam No. 1	$278,782.07	
Lock and Dam No. 2	297,822.45	
Lock and Dam No. 3	236,661.48	
		$813,266.00

For commercial statistics, see "Operating and care, locks and dams, Upper White River, Arkansas."

W 7.

OPERATING AND CARE OF LOCKS AND DAMS, UPPER WHITE RIVER, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

Lock and Dam No. 1.—The lower river crib was repaired by renewing 13 ties and 13 stringers, and the upper river crib by renewing 6 ties, 5 stringers, and 28 pieces of decking. The lower land crib was torn down to elevation 12 feet on L. M. S. gauge. Seventy-five cubic yards of derrick stone were placed in front of protection crib at the abutment. Six hundred and fourteen cubic yards of gravel and 655 cubic yards of stone were used in rebacking dam. One well (48 feet deep) was drilled in the lock-house yard. One hundred and eighty-five feet of house sewer were laid from the lock house to the river below the lock, and a new overflow pipe was placed on the water tank. Some minor repairs were made to decking of protecting crib at the abutment.

Lock and Dam No. 2.—The corner protection crib along the river wall of the lock was refilled with stone, 557 cubic yards of one-man stone being used. Seventy-five cubic yards of concrete blocks, in lieu of derrick stone, were made and placed along the river face of that protection crib. Fifteen cubic yards of one-man stone were used in refilling a settlement in the apron cribs along the section of the dam founded on piles. One hundred and twenty-five cubic yards of gravel were placed in a hole above the abutment, and 20 cubic yards of one-man stone were used in rebacking the dam. Five cubic yards of stone were used in refilling a settlement in the corner crib at the abutment. Nineteen stringers and three snubbing posts were renewed in the upper river crib; 18 ties, 8 stringers, and 1 snubbing post in the upper land crib; 6 stringers in the lower land crib, and 1 tie and 2 blocks in the 90-foot crib below abutment. One new spar was placed for one of the gates. Concrete steps were built from the lock terreplein up the levee slope, and a concrete walk built around the lock house.

Lock and Dam No. 3.—Four hundred cubic yards of one-man stone were procured and distributed along the west bank of the river below the abutment preparatory to extending the revetment. One hundred cubic yards of stone and 75 cubic yards of gravel were used in rebacking the dam. The decking to the fishway was relaid. A well house was built and a concrete walk and steps built to the lock house.

Dredging.—The dipper dredge cleared the lower approach to Lock No. 3, removing 120 cubic yards of gravel; dug a channel 723 feet long, 40 feet wide, and 6 feet deep through Batesville shoal; removed 12 snags, cut 7 overhanging trees, and dug out 2 rack heaps and 1 bowlder at Bell shoal; removed 60 cubic yards of gravel from the lower approach to Lock No. 2. Because of a break in the hull operations were suspended October 28 and the boat sent to Batesville for docking. By the time the repairs were completed the dredging season had passed.

Plant.—The towboat *Cleveland* having become unserviceable was dismantled. The steamer *A. D. Allen*, an Arkansas River packet boat, was purchased and necessary additions and alterations to fit it for towboat service were made. One derrick boat was sunk and dismantled, the hull not being worth raising. One 12 foot by 50 foot by

2 foot handy flat was built. The dipper dredge was side docked and repaired and calked below water line around the bow and corner posts. One new anchorage piece for main guy to "A" frame was placed. Telephone lines were repaired several times during the year.

ALLOTMENTS.

December 26, 1903, Lock and Dam No. 1	$600.00
June 22, 1904, Lock and Dam No. 1	3,701.00
February 10, 1905, Lock and Dam No. 2	1,095.00
June 28, 1905, Lock and Dam No. 2	4,850.00
July 7, 1905, Lock and Dam No. 2	30,000.00
July 13, 1905, Locks and Dams Nos. 1 and 2	8,094.00
July 13, 1906, Locks and Dams Nos. 1 and 2	23,479.00
May 29, 1907, Lock and Dam No. 2	3,200.00
July 13, 1907, Locks and Dams Nos. 1 and 2	44,715.00
January 20, 1908, Lock and Dam No. 3	1,040.00
July 27, 1908, Locks and Dams Nos. 1, 2, and 3	19,033.60
July 26, 1909, Locks and Dams Nos. 1, 2, and 3	21,516.99
Total allotments	161,324.59
Expended to June 30, 1910	155,293.38
Unexpended July 1, 1910	6,031.21
Outstanding liabilities July 1, 1910	2,142.68
Balance available July 1, 1910	3,888.53

Summary of expenditures during the fiscal year ending June 30, 1910.

Classification.	Lock and Dam No. 1.	Lock and Dam No. 2.	Lock and Dam No. 3.	Total.
Services	$3,240.03	$2,987.09	$3,760.23	$9,987.35
Materials	1,093.15	760.22	539.63	2,393.00
Supplies	1,183.71	1,362.81	761.50	3,308.02
Property	2,413.48	2,157.81	2,165.87	6,736.66
Unclassified	266.12	174.85	318.21	759.18
Total this year	8,196.49	7,442.28	7,545.44	23,184.21
Previous years	28,677.15	97,625.93	5,806.09	132,109.17
Total to date	36,873.64	105,068.21	13,351.53	155,293.38

COMMERCIAL STATISTICS.

	Lock and Dam No. 1.	Lock and Dam No. 2.	Lock and Dam No. 3.
Lockages ....number	137	803	527
Steam and gasoline boats ....do	4	387	240
Barges (towed), houseboats, etc ....do	128	663	474
Passengers ....do	....	574	354
Railway ties, rafted ....tons	624	2,692	1,394
Saw logs, barged ....do	127	127	127
Cooperage and wheel stuffs, barged ....do	....	14,780	7,478
Telegraph poles, rafted ....do	142	....	....
Farm products and supplies ....do	....	218	75
Miscellaneous ....do	....	117	33
Total freights ....do	893	17,934	9,107
Estimated value of freights	$3,836	$97,036	$43,165

The steamboats *G. W. Huff*, 66 net tons, and the motor boats *Angeline*, 14 net tons, and the *Pekin*, 8 net tons, were the boats which navigated the river during the year. In addition to the commerce which passed through the locks there were 2,306 tons, with estimated value of $10,029, that originated and terminated in pool 1 and in pool 3.

W 8.

IMPROVEMENT OF CACHE RIVER, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

A chopping party worked over the river from James Ferry (79) to the mouth. The work was started late in the season (November 1, 1909), hence the period of operations was shorter than usual, the work being suspended on December 17, 1909, on account of high water. Eight hundred and seventy-six snags were removed, 1,706 trees cut, and 8 drifts broken up.

The balance available July 1, 1910, will be expended in snagging operations carried on by means of a chopping party. This locality is worthy of maintenance by the present method—i. e., snagging operations. The amount estimated as being necessary during the fiscal year ending June 30, 1912, is for maintenance of channel and is based on the assumption that appropriations will be made annually hereafter.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$3,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

August 18, 1888–July 13, 1892, original project, Riverside to mouth of river		$9,000.00
August 17, 1894, maintenance of channel		2,000.00
June 3, 1896, maintenance of channel		2,000.00
March 3, 1899, maintenance of channel		1,000.00
June 13, 1902, maintenance of channel		2,000.00
March 3, 1905, maintenance of channel		2,000.00
March 2, 1907, maintenance of channel		2,000.00
March 3, 1909, maintenance of channel		3,000.00
June 25, 1910, maintenance of channel		3,000.00
Total appropriations		26,000.00
Expended on original project	$9,000.00	
Expended on maintenance to June 30, 1910	13,008.10	
		22,008.10
Unexpended July 1, 1910		3,991.90

COMMERCIAL STATISTICS.

The river was reported as being too shoal for navigation from August 15 to December 15, 1909. The channel depths over the controlling shoals during that time were 8 to 11 inches.

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[a] Exclusive of the balance unexpended July 1, 1910.

List of vessels that reported navigating Cache River from May 31, 1909, to June 1, 1910.

Name.	Net tonnage.	Draft, loaded.		Between—	Round trips.
		Steamer.	Barges.		
		Ft. in.	*Ft. in.*		
Rock City	64	2 2	5 0	Clarendon and Sandy Banks	1
				Brasfield and Trice Ferry	2
Jim T. Duffey	57	3 6	7 0	Mouth and High Banks	3
Forrester [a]	9	3 0	5 6	Clarendon and Browns	1
Daisy Dean [a]	6	2 0		Towing logs to Brasfield	32
Evaline [a]	4	1 6	2 0	Brasfield and Maberry	14

[a] Motor boats, gasoline power. All others, steamboats.

Classification of vessels that reported navigating Cache River.

Class.	Number.	Net tonnage.	Number of round trips.	Vessel mileage.
Registered:				
Steamers	2	57–64	6	280
Motor boats	2	6– 9	33	210
Unregistered, motor boats	1	4	14	984

The commerce reported for the year ending May 31, 1910, aggregated 23,426 tons, valued at $72,070. It was 16,734 tons of saw logs, 6,600 tons of railway ties, and 92 tons of miscellaneous. Sixty-two per cent of the total was rafted saw logs floated with the current. The remainder was transported in barges.

W 9.

IMPROVEMENT OF BLACK AND CURRENT RIVERS, ARKANSAS AND MISSOURI.

These works were consolidated by the river and harbor act of March 3, 1905, prior to which they had been provided for under separate appropriation titles.

OPERATIONS THIS FISCAL YEAR.

(A) BLACK RIVER.

The snag boat *Quapaw* worked over this river below the mouth of Current River (116) during the months of August and September, 1909. The snag boat *Riverside* (hand propelled) worked over the river from Corning Mills (177) to the mouth of Current River (116) during July, 1909, and during the months of October, November, and December, 1909, it worked over the river from the mouth of Current River (116) to Poplar Bluff (239), where it was laid up for the winter on December 20, 1909. The *Riverside* was beached at Poplar Bluff on May 27, 1910, for the purpose of repairing the hull. The repairs, consisting of 162 linear feet of new bottom strakes, 20 new deck beams, 66 linear feet of new gunwale, 506 square feet of new bottom, 520 square feet of new deck, and some minor repairs to upper works, were completed June 27, 1910. The cost of these repairs was $630.61.

At the close of the year the *Quapaw* is on the docks at Helena being rebuilt, and the *Riverside* is in ordinary at Poplar Bluff.

Summary of work done by the snag boats Quapaw and Riverside in Black River.

Boat.	Work done between—	Distance (miles).	Snags removed.	Trees cut.	Drifts broken.	Miles run.
Quapaw...........	Mouth of Black and mouth of Current River.	116	492	1,164	16	376
Riverside..........	Mouth of Current River and Poplar Bluff.	123	852	1,815	....	178
	Total, mouth to Poplar Bluff....	239	1,344	2,979	16	554

(B) CURRENT RIVER.

The snag boat *Quapaw* came into this river July 21, 1909, and worked over the river from its mouth to the mouth of Little Black River (32). On August 1 it towed the snag boat *Riverside* (hand propelled) from the mouth of the river up to Little Black and then was transferred to Black River. It returned to this river September 16, 1909, and again worked over the river from the mouth to the mouth of Little Black (32). On September 30, 1909, it towed the *Riverside* (hand propelled) from the mouth of Little Black River to the mouth of Current River, when the *Quapaw* was transferred to White River and the *Riverside* to Black River.

The snag boat *Riverside* (hand propelled) began work at the mouth of Little Black (32) on August 2, 1909. From there it worked up to Doniphan (53) and back. The *Riverside* could not go above Doniphan (53) on account of shoal water. A detail from her crew went above in a gasoline launch and by the use of dynamite, saws, and axes removed obstructions at Rapides (61), Jakes Valley (71), and Kelley Hollow (76).

Chopping party.—The river from Doniphan (53) up to Van Buren (94) is too small to be worked with any of the snag boats; therefore a chopping party with a small "raising" boat was organized and began operations at Van Buren (94) May 26, 1910. This party worked from Van Buren (94) down to Rapides (61). Information having been received that the new river and harbor bill had become a law, the party returned to Phillips Mill (75) on June 30, 1910, for the purpose of doing more thorough work from there down.

Summary of operations in Current River.

Boat.	Work done between—	Distance (miles).	Snags removed.	Trees cut.	Drifts broken.	Bowlders.	Miles run.
Quapaw............	Mouth of Current and Little Black.	32	221	1,227	13	....	260
Riverside...........	Mouth of Little Black and Doniphan.	21	520	1,185	....	....	42
Riverside detail....	Doniphan and Kelley Hollow...	23	35	61	....	....	46
Chopping party.....	Rapides and Van Buren........	33	172	164	3	24	47
	Total, mouth to Van Buren.	94	948	2,637	16	24	395

The balance available July 1, 1910, will be expended in snagging operations and maintaining the necessary plant. These rivers are worthy of improvement to that extent. The amount estimated as being needed for the fiscal year ending June 30, 1912, is for maintenance of channel by snagging operations, and is based on the assumption that appropriations will be made annually hereafter, and takes into consideration the probable balance that will be available July 1, 1911.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$7,100

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Appropriations for Black River have been made separately under the heads of "Improving Black River, Missouri," "Improving Black River, Arkansas," and "Improving Black River, Arkansas and Missouri." This river is understood not to have been included in the snagging operations under the early appropriations for snagging in western rivers. The appropriations for it and for Current River are:

Date of act.	Black River.	Current River.
June 2, 1872		$5,000.00
June 14, 1880	$15,000.00	
March 3, 1881	6,000.00	2,000.00
August 2, 1882	10,000.00	
July 5, 1884	20,000.00	
August 5, 1886	5,000.00	
August 11, 1888	12,000.00	
September 19, 1890	12,000.00	
July 13, 1892	5,000.00	
August 18, 1894	9,500.00	8,000.00
June 3, 1896	8,000.00	2,000.00
March 3, 1899	8,000.00	5,000.00
June 13, 1902	21,700.00	6,900.00
May 31, 1904, allotted from maintenance appropriation, act of June 13, 1902	[a]8,530.50	2,935.00
March 3, 1905 (apportioned)	13,000.00	5,000.00
March 2, 1907 (apportioned)	13,000.00	5,000.00
March 3, 1909 (apportioned)	12,000.00	6,000.00
June 25, 1910 (apportioned)	13,500.00	6,000.00
Total appropriations	192,230.50	53,835.00
Received from sales fiscal year 1907	7.00	
Received from sales fiscal year 1909	3.00	
Total receipts	192,240.50	53,835.00
Expended to June 30, 1910	172,876.39	45,191.87
Unexpended July 1, 1910	19,364.11	8,643.13

[a] Eight thousand five hundred dollars less $319.50 not used and returned to Treasury.

COMMERCIAL STATISTICS.

Black River below the mouth of Current River, 116 miles, was navigable all the year for boats of not over 3 feet draft; above Current River to Poplar Bluff, 123 miles, it was navigable all the year for boats of not over 2 feet draft.

Current River from its mouth to Little Black River, 32 miles, was navigable all the year for boats of not over 3 feet draft; from Little Black River to

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[a] Exclusive of the balance unexpended July 1, 1910.

Doniphan, 21 miles, all the year for boats of not over 16 inches draft, and from Doniphan to Van Buren, 41 miles, by small gasoline boats of 10 to 12 inches draft.

List of vessels that reported navigating Black River during the year ending May 31, 1910.

Name.	Net tonnage.	Draft loaded.		Between—	Round trips.	Passengers.
		Steamer.	Barges.			
		Ft. in.	*Ft. in.*			
Columbia	73	3 0	4 6	Jacksonport and Pocahontas	13	....
				Jacksonport and Current River	25	....
Geo. Pope	97	3 0	4 0	Jacksonport and Pocahontas	52	....
				Jacksonport and Current River	2	....
Choctaw	44	3 0	4 6	Newport and Lockharts	12	....
Starr	43	2 4	4 0	Newport and Log Camps	43	....
Pocahontas	35	2 4	4 0	Jacksonport and Strawberry	88	....
Leader No. 2[a]	10	2 8	2 10	Newport and Strawberry	25	....
J. M. Blunk[a]	8	1 6	3 6	Jacksonport and Current River	3	....
Valley King[a]	5	2 0	3 0	Calimine and Newport	50	....
Henry F. Kath[a]	5	1 10	3 6	State Line and Pocahontas	38	....
Ethel[a]	6	3 0	3 0	Gillis Bluff and Corning	75	110

[a] Motor boats, gasoline power. All others, steamboats.

Classification of vessels from which reports were received.

Class.	Number.	Net tonnage.	Number of round trips.	Vessel mileage.	Passengers.
Registered:					
Steamers	5	35–97	235	33,104	....
Motor boats	5	5–10	191	17,132	110

No reports received from unregistered vessels of which there are about 55 on this river.

List of vessels that reported having navigated Current River from May 31, 1909, to June 1, 1910.

Name.	Net tonnage.	Draft loaded.		Between—	Round trips.	Passengers.
		Steamer.	Barges.			
		Ft. in.	*Ft. in.*			
Geo. Pope	97	3 0	4 0	Mouth and Biggers	2	....
Columbia	73	3 0	4 6	....do	25	....
J. M. Blunk[a]	8	1 6	3 6	Mouth and Little Black	3	....
Gregory[a]	8	1 3	....	Doniphan and Kelley Hollow	21	....
Valley King[a]	5	2 0	3 0	Barging ties and staves	30	....
Ironsides[a]	5	1 3	....	Doniphan and Kelley Hollow	4	....
Epsie[a]	3	1 1	....	Doniphan and Mabrey Bay	70	350
Captain Bob[a]	3	1 1	....	Tucker Bay and Doniphan	104	581
Red Devil[a]	2	1 0	....	Doniphan and Big Spring	4	246
				Doniphan and Phillips Mill	32	
Ida May[a]	2	1 0	1 6	Doniphan and Buffalo	25	200
				Doniphan and Current River Club	50	500
				Doniphan and Van Buren	6	30
				Doniphan and Bay Mill	50	300
				Doniphan and Phillips Mill	5	50
Cherokee[a]	1	1 0	....	Phillips Mill and Doniphan	52	264

[a] Motor boats, gasoline power. All others, steamboats.

Classification of vessels for which reports were received for Current River.

Class.	Number.	Net tonnage.	Number of round trips.	Vessel mileage.	Passengers.
Registered:					
Steamers	2	73-97	27	1,134	....
Motor boats	4	5- 8	58	2,542	....
Unregistered motor boats	5	—1- 3	397	11,668	2,521

NOTE.—The "unregistered" boats operate out of Doniphan, Mo. No reports were received from unregistered boats on the other sections of the river.

Classification of commerce reported, year ending May 31, 1910.

Articles.	Black River.	Current River.	Articles.	Black River.	Current River.
	Tons.	*Tons.*		*Tons.*	*Tons.*
Lumber	17,580	164	Railway ties	7,085	5,835
Staves	3,800	3,504	Mussel shells	775	20
Provisions	610	121	Miscellaneous	739	280
Grain	500	232			
Spokes	3,438	....	Total reported	75,677	25,082
Saw logs	41,150	14,926	Estimated value	$471,219	$124,001

W 10.

IMPROVEMENT OF ST. FRANCIS AND L'ANGUILLE RIVERS AND BLACKFISH BAYOU, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

The hand-propelled snag boat *A. B. Johnson*, lying at Madison (70), was placed in commission July 1, 1909. From Madison the boat was towed to Burr Place (136). From there it worked up to Broadmouth (151), then down to the mouth of the river, then up to Madison (70), where it was laid up for the winter on December 31, 1909. In addition to the work on St. Francis River, snagging was done up L'Anguille to Marianna (8) miles, the lower reaches being worked by the snag boat and the upper reaches, where too shoal for the boat, by a chopping party detailed from the boat's crew. In St. Francis River 956 snags were removed from the channel, 1,740 trees cut, and 10 drifts broken up. In L'Anguille River 177 snags were removed and 100 trees were cut.

On May 21 and 22, 1910, the *Johnson* was towed to Helena, Ark., for the purpose of having extensive repairs made to the hull. The boat was placed on the docks May 26, returned to the water June 21, and towed back to Madison June 27 and 28. The repairs made consisted of placing 330 linear feet of floor strakes, 144 linear feet of deck strakes, 29 deck beams, 792 square feet of bottom, 967 square feet of deck, 90 linear feet of gunwale, 50 hull stanchions, 6 rake pieces, and 4 new spuds. The cost of these repairs was $1,416.53. At the close of the fiscal year the *Johnson* is in ordinary at Madison.

The balance available June 30, 1910, will be expended in snagging operations in St. Francis and L'Anguille rivers, and in snagging operations in Blackfish Bayou up to Fifteenmile Bayou, this having been added to this work by the river and harbor act of June 25, 1910. These rivers are worthy of the work contemplated. The amount estimated as being needed for the fiscal year ending June 30, 1912, is for maintenance of the channels previously mentioned by snagging operations, and is based on the assumption that appropriations will be made annually hereafter, and takes into consideration the probable available balance of July 1, 1911.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$2,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

The earlier examinations and the earlier operations were made under appropriations for these rivers in conjunction with other rivers. Of the expenditures under those appropriations this office has no record.

The separate appropriations are as follows:

March 3, 1871–March 3, 1899, St. Francis River (see H. Doc. 421, 57th Cong., 2d sess., p. 334)		$75,000.34
June 18, 1878–June 14, 1880, L'Anguille River (see H. Doc. 421, 57th Cong., 2d sess., p. 235)		17,000.00
June 13, 1902, St. Francis and L'Anguille rivers		9,000.00
May 31, 1904, St. Francis and L'Anguille rivers		4,237.19
March 3, 1905, St. Francis and L'Anguille rivers		6,000.00
March 2, 1907, St. Francis and L'Anguille rivers		12,000.00
March 3, 1909, St. Francis and L'Anguille rivers		9,000.00
June 25, 1910, St. Francis and L'Anguille rivers and Blackfish Bayou		9,500.00
Total appropriations		141,737.53
Received from sales in fiscal year 1909		3.00
Total receipts		141,740.53
Expended to June 30, 1910:		
On old projects	$92,000.34	
On present projects	35,622.08	
		127,622.42
Unexpended July 1, 1910		14,118.11

COMMERCIAL STATISTICS.

The river was too shoal for navigation by boats of 2-foot draft between the mouth and Fords bar (27) from September 20 to November 20, 1909; between Fords bar and Wittsburgh (98) from September 1 to December 1, 1909; and between Wittsburgh and Marked Tree (171) from August 15 to December 10, 1909. Boats of 6-foot draft could navigate any portion of the river below Marked Tree for five and a half months during the year; i. e., from the middle of February to the first week in August.

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[a] Exclusive of the balance unexpended July 1, 1910.

List of vessels reporting having navigated St. Francis and L'Anguille rivers between May 31, 1909, and June 1, 1910.

Name.	Net tonnage.	Draft loaded.				Between—	Round trips.	Passengers.
		Steamer.		Barges.				
		Ft.	*in.*	*Ft.*	*in.*			
Barrett	620	6	0	6	6	Mouth and Burnt Cane	4	....
Dolphin No. 3	564	4	0	6	0	Memphis and Blackfish	20	....
Josh Cook	384	4	6	6	6	Mouth and Burnt Cane	1	....
Mariner	371	6	0	6	6	Mouth and Blackfish	5	....
City St. Joseph	182	4	0	....		Memphis and Cow Bayou	9	163
Herman Paepcke	157	4	0	6	0	Helena and Collins Landing	10	....
Hazel Rice	101	3	6	6	0	Helena and Sand Slough	14	....
Kit Carson	96	3	0	6	0	Memphis and Blackfish	6	....
Nettie Johnson	72	3	6	4	6	Helena and Blackfish	19	504
Joy Patton	63	4	6	6	0	Memphis and Madison	3	....
Satellite	43	3	0	6	0	Memphis and Blackfish	10	....
R. E. Watkins	23	1	8	3	0	Helena, Marianna, and Madison	90	900
Chickasaw [a]	13	2	2	....		Parkin and Marked Tree	30	200
Rambler [a]	7	1	9	....		Parkin and Madison	18	....
Dora Clark [a]	4	3	0	2	6	Helena and Ashworth	2	20
						Marianna and Park Place	28	50
Emma [a]	3	2	4	1	6	Madison and Blackfish	50	150
Belle Elizabeth [a]	2	1	8	1	8	Madison and Wittsburgh	44	....
Wasp [a]	2	3	0	2	0	Marked Tree and Fortune Bayou	30	76
						Marked Tree and Parkin	19	19
Flora Belle [a]	....	2	0	1	0	.....do	50	100
Flora May [a]	....	1	1	2	0	Madison and Sand Slough	8	....
Grace Banner [a]	....	1	0	2	0	Wittsburgh and Madison	1	....
Red Horse [a]	....		8		8	Marked Tree and Broadmouth	10	....

[a] Motor boats, gasoline power. All others, steamboats.

Classification of vessels.

Class.	Number.	Net tonnage.	Round trips.	Vessel mileage.	Passengers.
Registered:					
Steamers	12	23–620	192	22,038	1,567
Motor boats	2	7–13	48	4,896	200
Unregistered, motor boats	8	(a)	242	19,186	415

[a] 4 tons and under.

Classification of commerce reported, year ending May 31, 1910.

Articles.	Tons.	Articles.	Tons.
Cotton	437	Round piles	2,500
Cotton seed	721	Lumber	7,692
Grain	445	Miscellaneous	484
Provisions	376		
Mussel shells	277	Total reported	180,270
Saw logs	167,338	Estimated value	$679,662

W 11.

IMPROVEMENT OF SALINE RIVER, ARKANSAS.

OPERATIONS THIS FISCAL YEAR.

Nothing done, the present appropriation having become available too late in the year.

This is a revival of an old project on which no work has been done since December, 1884.

The balance available July 1, 1910, will be expended in snagging operations below Turtle bar (135). The river is worthy of such maintenance. The work will be done by a chopping party. The estimated cost of the work as set forth in House Document 1212, Sixtieth Congress, second session, is $5,400 for clearing the river, then $3,000 *biennially* for maintenance; however, if the plan of making appropriations annually is adopted, the estimate of $3,000 biennially should be changed to $3,000 annually, for experience on other rivers of the same nature as the Saline has shown that $3,000 biennially will not maintain, to a reasonable degree, 135 miles of river.

APPROPRIATIONS.

Old project:	
June 14, 1880	$7,500
March 3, 1881	5,000
August 2, 1882	4,000
July 5, 1885	5,000
	21,500
New project, June 25, 1910	5,400
Total appropriations	26,900
Expended to June 30, 1910 (old project)	21,500
Available July 1, 1910	5,400

COMMERCIAL STATISTICS.

No reports of commerce have been received from this river during the time no work has been done on it. House Document No. 1212, Sixtieth Congress, second session, gives 55,000 tons of forest products moved in rafts and barges as the amount for 1906 and gives 115,000 tons as the prospective amount for 1907. The commerce to be benefited is the movement of forest products—saw logs, ties, and staves—transported in rafts and in barges.

APPENDIX X.

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. LOUIS, MISSOURI, DISTRICT.

REPORT FOR THE FISCAL YEAR ENDING JUNE 30, 1910, BY FIRST LIEUT. C. H. KNIGHT, CORPS OF ENGINEERS, OFFICER IN TEMPORARY CHARGE.

IMPROVEMENTS.

1. Removing snags and wrecks from the Mississippi River below the mouth of the Missouri River, and Old and Atchafalaya rivers.
2. Mississippi River between the Ohio and Missouri rivers.

Engineer Office, United States Army,
St. Louis, Mo., July 20, 1910.

Sir: I have the honor to transmit herewith the annual report for the work under the charge of this office for the fiscal year ending June 30, 1910.

Very respectfully,

C. H. Knight,
First Lieut., Corps of Engineers.

The Chief of Engineers, U. S. Army.

X 1.

REMOVING SNAGS AND WRECKS FROM THE MISSISSIPPI RIVER BELOW THE MOUTH OF THE MISSOURI RIVER.

A concise statement of the project for and history of this work will be found in the present Annual Report of the Chief of Engineers, United States Army, to which this is appended, as well as on page 2621 of the Annual Report of the Chief of Engineers for 1900.

This work is now being done by two large steel-hull snag boats—*J. N. Macomb* and *H. G. Wright*—fitted with all necessary tools and appliances and operated by hired men. They patrol the river between the mouth of the Missouri River and the mouth of Red River and Melville, La., on the Atchafalaya, occasionally going as far down the Mississippi as New Orleans, La.

Descriptions of these boats will be found in the Annual Report of the Chief of Engineers for 1895, page 2054 et seq.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

At the beginning of the fiscal year the *Macomb* was laid up in ordinary, engaged in annual repairs, until August 21, and thereafter patrolled the river in three round trips to Red River and Melville, on the Atchafalaya, one of which was continued to New Orleans, and thereafter, to take advantage of the high water, was again laid up for annual repairs April 2.

At the beginning of the fiscal year the *Wright* was also laid up in ordinary, undergoing repairs, until August 3, when patrol of the river was resumed. During the year this boat made three round trips over the district between the mouth of the Missouri River and the mouth of Red River and Melville, on the Atchafalaya. The boat returned to St. Louis, Mo., March 9, and was laid up because of high water, for annual repairs, until the end of the year.

The year's work embraced removal of a large number of wrecks due to the great Gulf storm in September, in which many river vessels were damaged and lost. The tours were also much interrupted and delayed by floating ice, which formed in unusual quantities both in the Ohio and Mississippi rivers, and which was met as far south as Greenville, Miss.

On account of the remarkably low stage of river prevailing at the close of the year the *Wright* was made ready and will go into commission and resume patrol of the river during the early part of July, and the *Macomb* will follow at proper interval.

A summary of the work accomplished during the fiscal year is given in the following table:

Name.	Snags pulled.	Trees cut.	Drift piles removed.	Wrecks removed.	Miles traversed.
J. N. Macomb	1,654	1,138	7	16	6,716
H. G. Wright	1,591	1,433	10	7	6,989
Total	3,245	2,571	17	23	13,705

The trees referred to were trees in bends of the river that were liable to fall into the stream and become obstructions to navigation.

The work upon wrecks and sunken vessels during the year was as follows:

The snag boat *Macomb*, September 17, 1909, broke up barge opposite Greenville, Miss.; September 28, 1909, raised tug *S. S. Prentiss* below Natchez, Miss.; October 8, 1909, removed wreck of steamer *Buck Elk* from canal at Vicksburg, Miss.; October 9, 1909, broke up barge at Delta, La.; October 12, 1909, broke up 5 barges at Natchez, Miss.; October 22, 1909, removed part of ferryboat *Washington* at Donaldsonville, La.; October 29, 1909, removed wreck of steamer *Conquest* opposite Point Coppee; November 29, 1909, dragged over wreck of barge at O'Donnells; January 3, 1910, removed part of wreck of steamer *McDougal* at Rosedale, Miss.; January 3, 1910, rescued stranded barge *No. 34* at Wagner Landing, Ill.; February 11, 1910, broke up barge at Caruthersville, Mo.; March 30, 1910, destroyed remainder of U. S. barge *No. 203*, foot of Ste. Genevieve Bend.

The snag boat *Wright*, August 3–4, 1909, broke up part of wreck of snag boat *De Russy* at Bridgewater Island; October 8, 1909, recovered two railroad car trucks at Chester, Ill.; November 26, 1909, broke up barge at Poorhouse Field; December 14, 1909, broke up barge at Angola, Miss.; January 3, 1910, broke up barge at Greenville, Miss.; January 25, 1910, broke up barge at Chobard, Miss.; February 8, 1910, raised sunken barge at Helena, Ark.; March 4, 1910, broke up part of U. S. barge *No. 203* at Ste. Genevieve Bend.

APPROPRIATIONS.

The appropriations from the beginning of the work to the year 1878 were made in lump sums, principally under the titles of "Improvement of the Mississippi, Missouri, and Arkansas rivers," and were applied to the several streams as their needs or the terms of the laws required. Appropriations from 1879 to 1888 were specifically made or allotted for this work. In the latter year, August 11, an expenditure of an amount not to exceed $100,000 annually was authorized, under which act this work has been prosecuted ever since.

The details of the expenditures and the work done are shown in the following table:

Table of amount expended and work done in removing obstructions in Mississippi River between mouth of Missouri River and New Orleans, La., from March 28, 1868, to June 30, 1910.

Year.	Amount expended.	Work done.			
		Snags pulled.	Trees cut.	Drift piles removed.	Wrecks removed.
March 28, 1868, to June 30, 1871	....	3,271	37,438	30	....
Fiscal year ending June 30—					
1872	....	1,365	2,621	12	....
1873	$46,901.40	1,365	1,713	5	....
1874	72,802.80	630	515	6	....
1875	70,727.01	1,461	2,984	14	....
1876	49,854.80	1,213	1,589	5	1
1877	36,220.08	676	403	4	....
1878	20,122.54	889	3,346	1	....
1879	121,820.16	1,133	2,690	5	....
1880	74,988.94	1,522	60	19	....
1881	102,308.43	1,057	647	6	....
1882	75,311.29	1,909	4,983	32	....
1883	69,540.59	2,775	26,297	34	....
1884	18,390.48	958	4	3	....
1885	45,395.47	1,692	16,900	....	....
1886	20,047.71	693	567	....	....
1887	43,583.12	2,030	5,269	10	....
1888	17,302.29	798	348	....	....
1889	67,511.37	1,864	9,102	34	8
1890	49,089.17	2,861	12,112	23	1
1891	92,720.97	3,450	21,316	37	....
1892	98,250.00	3,389	20,571	....	....
1893	96,497.23	2,946	8,214	16	....
1894	88,252.46	3,057	22,861	19	5
1895	100,000.00	3,307	17,520	22	3
1896	80,496.26	2,979	19,648	11	1
1897	83,421.64	3,072	31,014	24	2
1898	88,917.74	4,253	14,856	32	3
1899	88,923.15	3,300	30,695	34	....
1900	86,355.29	4,479	15,170	19	....
1901	86,710.05	3,566	19,746	28	....
1902	93,055.27	3,907	28,870	27	7
1903	72,587.48	1,552	6,895	2	....
1904	88,245.25	4,654	17,034	18	2
1905	81,822.81	4,118	15,241	19	12
1906	85,662.36	2,564	14,478	16	....
1907	85,669.59	3,339	2,772	23	7
1908	97,889.35	3,744	5,175	19	6
1909	100,021.03	4,526	2,406	27	23
1910	96,782.04	3,245	2,571	17	23
Total	2,794,197.12	99,609	446,641	653	104

Amount expended during the fiscal year was $96,782.04. A statement of this expenditure, as required by law, is given in the accompanying table showing the summary of expenses of operating the snag boats.

BEAVER DAM ROCK.

Authority was obtained December 15, 1906, to apply part of the appropriation for removing obstructions to the removal of Beaver Dam rock (and other rocks), considered obstructive and dangerous in the channel. Work upon Beaver Dam rock was not begun until the low water of the fall season of 1907. An accurate survey and exploration of the entire rock was made to a depth of 12 feet below the zero of the gauge at Commerce, Mo., about 1 mile distant. At this depth the rock covers about 1¾ acres, rising in numerous peaks, the highest reaching the elevation of the 8.5-foot stage on the gauge, and the whole containing about 12,000 cubic yards of soft sandstone. Of this quantity, about one-third, covering an acre of the rock, was to be removed by blasting to secure 8 feet clear depth over the ledge at a zero stage.

In this fiscal year during the time of operations 5,000 square feet, 250 cubic yards, or about 13 per cent of the area and contents of the rock to be removed, were drilled and blasted; this, in addition to the work previously accomplished, constitutes about one-half of the work originally contemplated.

The work during the season in review was much interrupted by unusual and frequent quick rises in the river, and was brought to a close by the early formation of ice.

The work will be resumed during the coming low-water season.

The headquarters of the snag boats is in St. Louis.

It is proposed during the coming year to continue operating these boats, as provided in the river and harbor act of August 11, 1888.

The work done is of great benefit to the commerce and navigation on the river. Before the river was so completely patrolled as it now is the sinking of steamboats and other river craft by running on snags was of common occurrence. During recent years such disasters have seldom occurred. Although life and property would seem to be much safer than formerly, the rate of insurance has not materially decreased.

The statistics relating to the commerce benefited by the operation of these boats will be found in the report of operations for this year for the improvement of the Mississippi River from the mouth of the Missouri to the mouth of the Ohio River, and in the reports of the Mississippi River Commission and the district officers thereunder.

EXPENDITURES.

Previous to March 3, 1879 (approximated)	$358,627.35
By act of—	
March 3, 1879	100 000.00
June 14, 1880	100,000.00
March 3, 1881	80,000.00
March 2, 1882	85,000.00
July 5, 1884	72,950.63
August 5, 1886	56,250.00
August 11, 1888	100,000.00
Fiscal year ending June 30—	
1890	49.089.17
1891	92,720.97
1892	98,250.00
1893	96,497.23
1894	88,252.46
1895	100,000.00
1896	80,496.26
Fiscal year ending June 30—Continued.	
1897	$83,421.64
1898	88,917.74
1899	88 923.15
1900	86,355.29
1901	86,710.05
1902	93,055.27
1903	72,587.48
1904	88,245.25
1905	81,822.81
1906	85.662.36
1907	85,669.59
1908	97,889.35
1909	100,021.03
1910	96,782.04
Total	2,794,197.12

Summary of cash expenditures in connection with the work of removing obstructions in Mississippi, Atchafalaya, and Old rivers during the fiscal year ending June 30, 1910.

Application.	For fiscal year 1909.	1909.					
		July.	Aug.	Sept.	Oct.	Nov.	Dec.
Office expenses	$78.81	$1.00		$23.09	$18.00	$752.55	$39.09
Expenses of snag boat H. G. Wright:							
Crew		1,748.00	$2,184.83	2,190.00	2,146.66	2,176.00	2,185.33
Outfit	14.90		1,051.82	1.10			
Fuel	557.13	137.14	690.73	782.47	791.91	860.82	760.50
Subsistence		299.48	802.77	307.37	680.67	743.98	195.88
Supplies			24.75	19.05	1.50		
Repairs	485.28	161.77	40.69	57.67	757.29	231.53	
Miscellaneous			2.67				
Expenses of snag boat J. N. Macomb:							
Crew		1,855.67	1,923.50	2,225.00	2,198.67	2,183.00	2,173.00
Outfit	6.50	45.75	924.76	802.71			5.90
Fuel	415.37	405.01	234.42	263.71	1,082.95	719.77	670.05
Subsistence			954.58		838.38	292.13	679.68
Supplies			8.39				33.54
Repairs	3,071.05	1,984.14	333.84	12.08	707.29	231.54	8.10
Miscellaneous			2.67				6.54
Beaver Dam rock	783.88						
Total	5,412.92	6,637.96	9,180.42	6,684.25	9,223.32	8,191.32	6,757.61

Application.	1910.						
	Jan.	Feb.	Mar.	Apr.	May.	June.	Total.
Office expenses	$721.36	$718.44	$35.70	$34.31			$2,422.35
Expenses of snag boat H. G. Wright:							
Crew	2,188.34	2,165.50	1,784.67	1,540.00	$1,495.00		21,804.33
Outfit			3.90	10.50	16.04	$55.45	1,153.71
Fuel	607.05	284.40	286.02	292.95			6,051.12
Subsistence	295.32	389.24	409.90	98.94	256.37	198.03	4,677.95
Supplies			54.75	119.64	79.51	93.00	392.20
Repairs	75.00	9.10	171.64	577.29	1,391.27	541.17	4,499.70
Miscellaneous		.50					3.17
Expenses of snag boat J. N. Macomb:							
Crew	2,208.33	2,213.00	2,186.33	1,508.00	1,666.34		22,335.84
Outfit				23.10			1,808.72
Fuel	765.66	421.27	626.85	97.20			5,702.26
Subsistence	200.10	592.61	216.67	97.94	463.23	8.82	4,344.14
Supplies				39.07	150.18	96.24	327.42
Repairs	5.75			353.46	303.50	536.70	7,547.45
Miscellaneous		5.00					14.21
Total	7,061.91	6,799.06	5,776.43	4,792.40	5,821.44	1,529.41	83,084.57
Removal of Beaver Dam rock:							
Labor							5,212.73
Material, etc							1,417.72
Drill boat							2,199.15
Subsistence							746.82
Miscellaneous							74.94
Use of plant, etc							977.89
Snag boat David Tipton							3,068.22
							96,782.04

RECAPITULATION.

Expenses of office and snag boats:	
Fiscal year 1909 (paid in 1910)	$5,412.92
Fiscal year 1910	81,523.75
Removal of Beaver Dam rock	9,845.37
Total	96,782.04

X 2.

IMPROVEMENT OF MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS.

PROJECT OF 1881, REVISED IN 1883, 1903, AND 1905, AND RESTORED 1910.

A concise statement of the project for and history of this work will be found in the Annual Report of the Chief of Engineers for 1906, page 462, as well as on page 2631 of the Report of the Chief of Engineers for 1900.

Reference should be made to the Report of the Chief of Engineers, United States Army, for 1894, pages 1577 et seq., for information relating to the development of the various forms of construction and for a résumé of the various types employed between 1872 and 1894, and to the Reports of the Chief of Engineers, United States Army, for 1895, page 2059; 1896, page 1717; 1897, page 2012; 1898, page 1698; 1900, page 2632; and 1901, page 2169, for minor details as to forms of construction.

The project adopted for the permanent improvement of the Mississippi River between the mouths of the Ohio and Missouri rivers was approved by the Chief of Engineers, United States Army, March 31, 1881. The estimate of the cost, as revised in 1883, was $16,397,500. The project was modified by the river and harbor act of June 3, 1896, to permit the construction and operation of dredges. It was again modified in 1903 by the Board of Engineers for Rivers and Harbors in report dated November 12, 1903, the dredging recommendation of which was adopted by Congress in the river and harbor act of March 3, 1905, as the principal means of improvement.

In the river and harbor act approved June 25, 1910, the plan of 1881, and dredging, is reverted to as the plan to be followed in prosecution of the improvement, with a view to its completion within twelve years.

By the report of 1903 the cost is increased $20,000,000 in addition to expenditures already made, provided the projects in force be adhered to throughout. The recent report of the Board on Examination and Survey of Mississippi River from the Lakes to the Gulf, March 20, 1909, puts the cost of completion of the project, 1881, at $21,000,000, adding $1,000,000 to the estimate of the 1903 Board to compensate for deterioration of permanent works during recent years in which there have been no funds available for their repair.

The river and harbor act of June 25, 1910, revived the project of 1881, modified to include dredging, and appropriated $500,000. The sundry civil act of the same date appropriated $250,000. Thus under the present revised project, which is estimated at $21,000,000 for completion, there have been appropriated $750,000, leaving a balance of $20,250,000 to be appropriated.

The total amount appropriated to June 30, 1910, is $13,894,999.98. Deducting the $750,000 provided in this year's acts, we have $13,144,999.98, which has been provided prior to the latest modified project. Of this $180,000 were expended between the Illinois and Missouri rivers, including Alton Harbor—beyond the limits of the project. There was also expended $1,400,000 for methods of improvement under the acts of 1905 and 1907, 1908, 1909. Deducting these two items gives us $11,564,999.98, which is properly the amount that has been available for work on the project prior to its latest revision. Of this amount $11,532,440.15 were expended to June 30, 1910, leaving a balance of $32,559.83, largely covered by outstanding liabilities and uncompleted contracts.

The balance available June 30, 1910, is $782,559.83, of which $750,000 is under the latest revised project, and $32,559.83 under the limited project of 1905.

Since the adoption of the project work has been done, substantially according to the methods referred to, at the following localities: Mouth Missouri River, Sawyer Bend, St. Louis Harbor, Cahokia Chute, Arsenal Island, Horsetail bar, Carroll Island, Twin Hollows, Pulltight, Beards Island, Chesley Island, Jim Smiths, Sulphur Springs, Foster Island, Lucas, Herculaneum, Calico Island, Cornice Island, Forest Home, Osborne Field, Michaels Landing, Rush Tower, Fish Bend, Danby Landing, Ames Island, Rush Towhead, Penitentiary Point, Sycamore Landing, Fort Chartres, Crooks, Turkey Island, Mudd Landing, Moro Island, Ste. Genevieve, Fairy Island, Kaskaskia Island, Horse Island, Chester, Crain Island, Liberty Island, Liberty Bend, Lacours Island, Willard, Hamburg, Devil Island, Minton Point, Cape Girardeau, Commerce Island, Burnham Island, Powers Island, Goose Island, Philadelphia Point, Commercial Point, Prices Landing, Buffalo Island, Dogtooth Bend, Greenleaf Bend, Beechridge, Hurricane Field, Eliza Towhead, Eliza Point, Greenfield Bend, and vicinity of Cairo.

WORKS OF IMPROVEMENT.

Because of the small balance of funds available for the construction of works of permanent improvement, operations were confined principally to the fall low-water season and entirely to repair and maintenance of bank revetments already placed under the project of 1881. The standard forms of construction were used.

During the fiscal year work was carried on, as hereinafter described, September 1 to December 15, 1909, at Pulltight, Chesley Island, Foster Island, Forest Home, Crain Island, and Liberty Bend, and March 7 to 24, 1910, at Chester, Mo. (Horse Island).

These locations are shown on the accompanying plates, 1–4.

The four suction dredges under this office were in commission throughout the entire low-water season of navigation, August 1 to December 20, 1909, and operated upon 23 bars which developed in that time, and at the inclines of the Illinois Southern Railway at Little Rock, Mo., and Moro Island.

In addition, by contract with The Ohio River Contract Company, a dipper dredge was operated, September 9–November 30, for the removal of gravel and bowlders from the low-water channel across the bar at Grand Tower, Ill. The material composing this bar contains bowlders and gravel that can not be handled by suction dredges.

Surveys were made of all dredged channels and shoal crossings, caving banks, and of several harbors for the vessels of this engineer district during the winter.

Gauges were maintained and read throughout the year, and six were inspected, repaired, and painted.

The plant was repaired and cared for at the engineer depot, St. Louis (3), and in fleet at Santa Fe, Ill. (140).

Materials were procured by contract and by hired labor, as was deemed most advantageous to the United States.

The engineering operations during the year have been executed under supervision of Mr. Wm. S. Mitchell, assistant engineer, by Messrs. C. D. Lamb, W. M. Penniman, F. Y. Parker, J. W. Skelly, and Philip Florreich, jr., assistant engineers.

Reports from assistants, giving details and accompanied by charts showing locations of the various works, are on file.

CONSTRUCTION WORKS.

PULLTIGHT, ILL. (16 MILES BELOW ST. LOUIS).

[October 2–28.]

Repairs to bank protection.—The bank at this locality from stations 37 to 51 and 69+50 to 73 had been cut away inside the old protection mattress during the high water of the previous year, with maximum recession of about 150 feet.

A brush mattress was built and placed along the eroded bank and the revetment was restored to a 14-foot stage between stations 37 and 44 and to an 18-foot stage thence to station 73. At stations 37+50 and 43+30 two hurdles, 125 feet and 85 feet, respectively, in length, each in a single row of 3-pile clumps, were built to a 21-foot stage, connecting the old work and the shore. A mattress was placed and a single-pile hurdle, 105 feet long, was built in a deep pocket which had formed back of the stonework between stations 51 and 56.

At this locality 126,535 square feet of mattress and 39,860 square feet of stonework were placed, 109 piles were driven, 14 stringers were hung, and 500 cubic yards of earth were moved in grading.

CHESLEY ISLAND, MO. (20 MILES BELOW ST. LOUIS).

[September 9–October 1.]

Repairs to bank protection.—The bank had been cut away inside the original protection at the head of the island, for a distance of about 1,400 feet, between stations 0 and 16. A shore mattress of brush was placed along the eroded bank connecting with the old work at station 16, and the revetment was restored to a 20-foot stage.

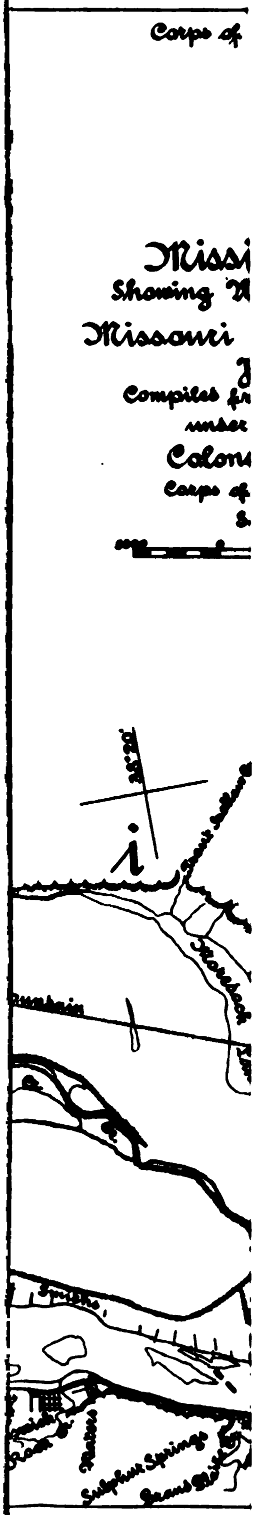
At this locality 80,350 square feet of mattress and 47,510 square feet of stonework were placed and 837 cubic yards of earth were moved in grading the bank for the reception of the stone.

FOSTER ISLAND, ILL. (26 MILES BELOW ST. LOUIS).

[October 29–November 15.]

Repairs to bank protection.—At this locality the bank had been cut away inside of the protection at its upstream end for a distance of 600 feet, stations 0 to 6, and from stations 7 to 9+15, a slide in the bank had destroyed the stonework.

In repair, a mattress of brush was built and placed along the eroded bank, connecting with the old mattress at station 6; a mattress was also placed in the caved recess, station 8+45, and the stonework was restored along the eroded bank to a 15-foot stage. A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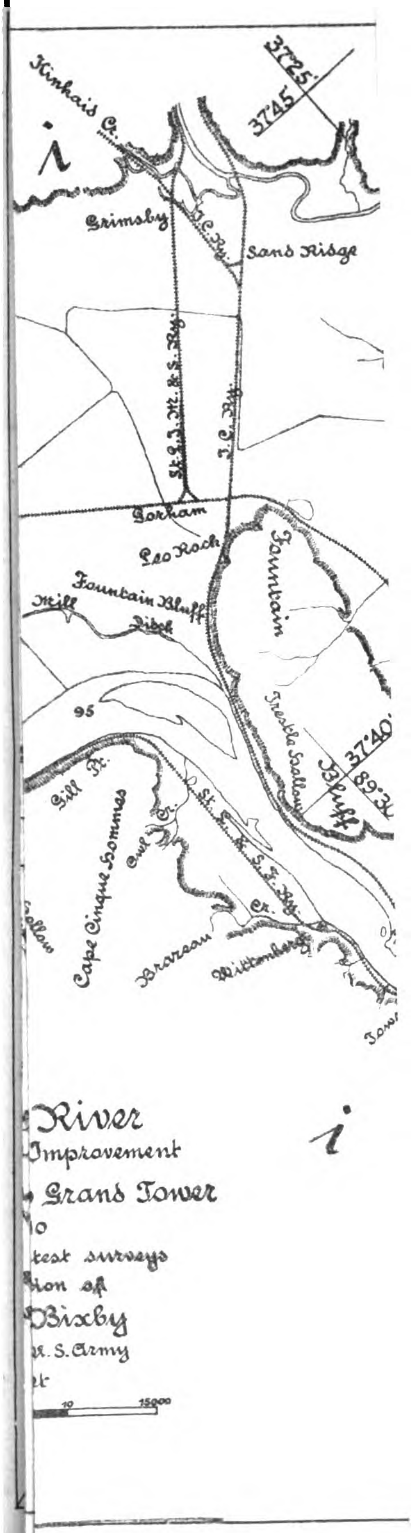
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Cape Cinque Hommes
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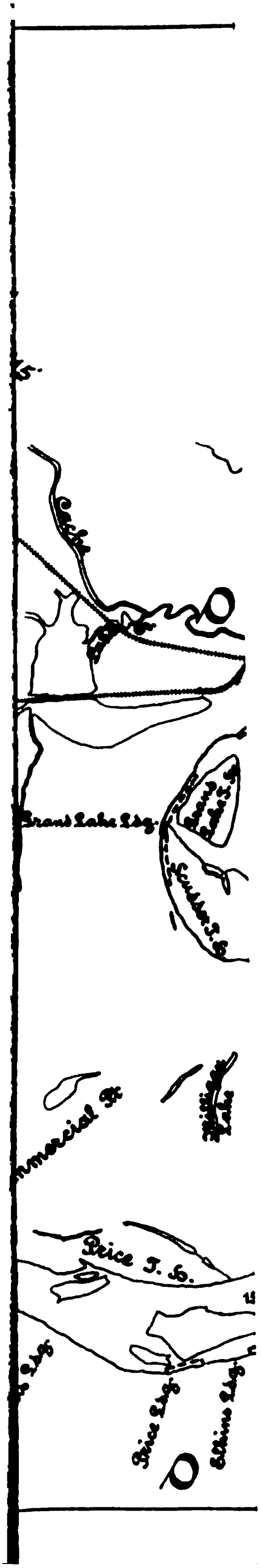
Bank Protection

and St. Louis Bridge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Cache
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3-pile clump hurdle, 115 feet in length, was built at station 5+20, connecting the new shore protection and the submerged old revetment, and a single-pile hurdle, 61 feet in length, at station 8+45 in the recess.

In these works 85,245 square feet of mattress and 33,360 square feet of stonework were placed; 63 piles were driven, 6 stringers were hung, and 709 cubic yards of earth were moved in grading.

FOREST HOME, ILL. (35 MILES BELOW ST. LOUIS).

[November 16–December 1.]

Repairs to bank protection.—The protection at this locality had been damaged by several slides and washouts in the work placed in 1904.

In the repairs, brush mattresses were built and placed in the various recesses stations 68+35 to 72+60, and at stations 42 and 62 to check threatening eddies. At stations 75+80, 76+50, and 77+55, hurdles, respectively, 36, 64, and 55 feet long, were constructed to a 25-foot stage, each consisting of a single row of 3-pile clumps at the river end and single piles at the shore end.

In this work 52,650 square feet of mattress and 38,770 square feet of stonework were placed; 64 piles were driven and 646 cubic yards of earth were moved in grading.

CHESTER, MO. (HORSE ISLAND) (70 MILES BELOW ST. LOUIS).

[March 7–24.]

Repairs to bank protection.—The extremely heavy ice gorges of the winter carried away part of the stone paving of the revetment along the head of the island, and at once, in the spring, to prevent threatened extension of the damage, repair of the work was undertaken with a supply of materials (stone and brush) which had been carried over during the winter.

The repairs were made by placing brush mattresses from station 9+80 to 17+25, and grading and paving the bank, along the entire length of the mattress, with stone to a 25-foot (Chester, Ill., gauge) stage. the stonework connecting at both ends with that placed in previous years.

A pocket mattress, 180 feet long, was built in a cave in the bank between stations 29+93 and 31+73, but no paving was done.

In all 52,460 square feet of mattress and 16,450 square feet of stonework were placed, and 1,600 cubic yards of earth were moved in grading the bank for the reception of the stone.

CRAIN ISLAND, MISSOURI (73 MILES BELOW ST. LOUIS).

[October 7–November 29.]

Repairs to bank protection.—Several slides had occurred in the upstream portion of this protection, and the bank had been cut away inside it from station 32 to 63+80, with maximum recession of about 200 feet.

Mattresses of brush were built and placed in the pockets formed between the shore and the old revetment, and a hurdle 75 feet in length, in a single row of 3 pile clumps, was built at station 56 to fill out the shore line to the old revetment; and the stonework was restored along the bank up to a 22-foot stage.

In these repairs 71,500 square feet of mattress and 99,981 square feet of stonework were placed, 71 piles were driven, and 347 cubic yards of earth were moved in grading the bank.

LIBERTY BEND, ILLINOIS (81 MILES BELOW ST. LOUIS).

[November 30–December 15.]

Repairs to bank protection.—The stonework was found in good condition except in a few places, and the repairs were in continuation of work left unfinished during the season of 1908, i. e., below station 130.

Mattresses of brush were built in the pockets formed by bank slides and between the old revetment and the new shore, where the bank had been cut away. The stonework was restored to the original stage of 20 feet, and two short hurdles were built in pockets at stations 98+50 and 102.

In the repairs 17,530 square feet of mattress and 64,820 square feet of stonework were placed and 59 piles were driven.

Field operations for the repair of permanent works of improvement were in process at Liberty Bend until December 10, when all work for the season was suspended on account of a sudden rise of river to high stage, accompanied by severe cold weather and danger from ice.

All plant was taken to winter harbor December 15.

DREDGING.

On approach of the low-water season the four dredges belonging to this engineer district were made ready for service. All were put into active service in August, and throughout the low-water season were operated wherever necessary, and were withdrawn from service and sent to winter quarters when threatened by ice.

The dredges were in commission as follows: *No. 3*, August 6 to December 15; *No. 4*, August 6 to December 16; *No. 5*, August 1 to December 23; and *No. 6*, August 1 to December 20; a total of 552 days.

Work was done on 23 bars and shoals, upon all of which beneficial results were obtained and the required channel depth of 8 feet secured, with exception of the crossing at Grand Tower, where for a short time but 7 feet was had. On this crossing a dipper dredge under contract was engaged, September 27 to November 5, in removing the gravel and bowlders which obstructed the crossing, and which could not be handled by the suction dredges of the district.

During the season a channel approximately 1,800 feet long by 75 feet wide (see pl. 6) was excavated through this bar, down to a level 3 feet below the zero of the Grand Tower gauge, completing the work over nearly one-half of the area to be dredged. The progress made was only fair, there being many interruptions of work due to breaking down of the dredge and to the unusual high-water stages and severe weather at the close of the season, putting a stop to work, which will be resumed during the low stages of the coming fall.

The materials excavated, containing many bowlders ranging from one-half cubic foot to 45 cubic feet in size, was used in building two dikes extending from the Illinois shore below the town of Grand Tower, toward the upper end of the bar above Grand Tower Island, to close, at low stages, the river chute east of that island. These dikes had been extended into the river for 250 feet when operations were suspended.

The contract, under date of September 9, 1909, is with The Ohio River Contract Company, Evansville, Ind., at 27½ cents per cubic yard; the original estimated cost of the dredging required on this crossing was $13,500, and the quantity of material to be removed approximately 50,000 cubic yards. During the year the amount expended was $5,961.45; the quantity of material removed 21,678 cubic yards.

The shoals dredged upon by the suction dredges of the district were at Pulltight, Whitehouse, Meramec River, Chesley Island, Sulphur Springs, Sunnyside, Riverside, Selma, Fort Chartres, Baumstarks, Okaw River, Manskers, Seventy-six, Grand Tower, Apple Creek, Crawfords, Bainbridge, Giboney Island, Brooks Point, Thompsons, Grand Lake, Missouri Sisters, Beechridge, and at the car ferry incline of the Illinois Southern Railway at Moro Island.

All of the localities are shown in the accompanying plates 5, 6, and 7.

Fluctuations in the stage of river caused shifting of the shoals at Baumstarks, Seventy-six, Bainbridge, Thompsons, Grand Lake. and Beechridge, necessitating repetition of dredging at these localities, so that the total number of channels dredged at the 23 localities named, was 29, with a combined length of 44,000 feet and an average width of 200 feet. The total amount of material dredged was about 1,750,000 cubic yards, in 1,829 working hours, or at an average of 950 cubic yards per hour. After their completion the dredged channels were in constant use by river craft, and maintained the 8-foot depth required throughout the district.

The dredges were engaged in actual excavation less than one-seventh of their time in commission. The final cost of dredging was about 10 cents per cubic yard of sand moved, including the cost of idle time and upkeep and repairs during the entire year. If the dredges had been run for the entire time in commission the expense would have been augmented only by the increased amount of fuel, oil, etc., consumed, and the cost for such continuous operation with the same average output would have been below 2 cents per cubic yard. As the dredges must be held in readiness for work as it offers, depending upon fluctuations in river conditions, wide variation in cost of the work from year to year can not be avoided.

The prevailing stages of river during the dredging season were about normal, 13 to 8.5 feet, St. Louis gauge, in August and September, passing to very low, 5 feet, from the latter part of that month to the early part of November, and thereafter, with several severe fluctuations, unusually high, 13 to 25 feet, till the end of the season.

PLANT.

The efficiency of the plant was maintained by ordinary or extraordinary repairs as were required.

No addition was made to the number of vessels in any class of the floating plant.

The 6 barges, 2 quarter boats, 1 derrick boat, and a steel tender loaned in 1907 and 1908 to the Memphis office were retained in that district throughout the year.

Three barges, built in 1891 and 1895, were condemned, being unserviceable, not worth rebuilding and a source of expense for care. They were advertised for sale, but bids received were insignificant and therefore rejected. The barges will be broken up and the parts used, if possible, in general repairs to plant.

Engineer depot, etc.—The shop buildings, machinery, tools, and appliances at the engineer depot and at the Little Rock quarries, and the fleet, together with all steam vessels, other floating plant and their equipment, were kept in order; but only ordinary repairs absolutely necessary were made.

Ice gorges formed during the early part of January finally extended in series for about 100 miles from the mouth of the Illinois River, on the Mississippi, and the Gasconade on the Missouri River, downstream past St. Louis to Kaskaskia.

The gorges finally packed tight and the water in St. Louis Harbor rose rapidly to 31.9 feet on the gauge January 14, an unprecedented height at this season and from such cause. The gorges then broke and the ice swept out with the rapidly falling river, causing great damage by stranding and crushing to all the shipping in the harbor.

The floating plant of this district wintering at the engineer depot consisted largely of old vessels awaiting condemnation or repair. Of these, 12 vessels (3 pile drivers, 1 office boat, 1 wharf boat, and 7 old barges) were shoved out on the bank and left stranded and more or less damaged, though on account of their condition this did not seriously affect their value or constitute serious loss. The best were again floated, but others were allowed to remain on shore awaiting decision as to their disposal.

One old barge, *No. 203*, was carried off by the ice and was completely wrecked on a bar near Ste. Genevieve, Mo., and was afterwards destroyed by the snag boats.

Steel dredges *Nos. 3* and *4* were also at the engineer depot and were pushed out on the bank by the ice. *No. 3*, however, was nearest the water and was launched back within the next few days without any damage whatever; but *No. 4* was stranded on a high bank at about the level of a 25-foot stage, on top of a mass of ice, and with the after end and nearly half the dredge length projecting over the bank. Before this end could be properly supported the overhanging weight broke the steel decks and sides about amidships, and the end of the dredge dropped down about 9 feet. Fortunately the line of damage lay through empty coal bunkers between the boilers and dredging machinery, neither of which was hurt.

The bank on which the damaged dredge rested was graded with water jets to an even slope, and the ruptured decks, side and floor beams were brought back into accurate contact and repaired with cover plates, so that the entire structure is again as straight and strong as originally built. The dredge was launched, and the woodwork, deck houses, and cabins were repaired after the vessel was floated.

The entire loss on this vessel through damage and repairs was less than $2,500.

MATERIALS.

Of the materials required for the repairs to revetments, the stone, 16,088 cubic yards, was purchased by contract, and the brush, 2,785 cords, was procured by hired labor.

PHYSICAL DATA.

The gauges were maintained and read daily throughout the year, and their records have been plotted on the hydrograph.

During the year the river oscillated between stages 0.1 foot (December 24, 1909) below and 31.25 feet (July 16, 1909) above standard low water (4 feet, St. Louis gauge).

MEASUREMENTS OF DISCHARGE.

On January 11, 1910, during the ice gorge, a measurement of the discharge of the river was made at the United States engineer depot. The water had for several days been held up by the gorge steadily at about the 21-foot stage, so that the flow measured represented the amount of escape through the gorge. The observation was made with two current meters, lowered simultaneously through holes cut in the ice. The resulting discharge was about 110,000 cubic feet per second. This, though seemingly very large for winter conditions, is confirmed by the hydrograph and discharge diagrams of the St. Louis gauge. The amount represents the flow of an 8.5-foot stage, St. Louis, and that stage is indicated by the slope diagram as corresponding to the 9.6-foot stage, which then obtained on the Grand Tower gauge, the first gauge below the gorges, unaffected by ice, and responding to the escape flow.

EXAMINATIONS, SURVEYS, BUOYS, ETC.

Surveys were made at all localities for dredging and at such other places as indicated great changes due to caving banks and in condition of works of improvement.

Buoys were placed and maintained throughout the low-water season at all dredged channels and on the reefs at numerous other crossings.

Special examinations were made, as required, at the sites of bridges, to determine whether the structures, proposed or in process of construction, were obstructive to navigation.

Numerous inspections were made, as required, of materials and appliances purchased in this vicinity, under contracts, for the Isthmian Canal Commission.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$800,000	
For maintenance of improvement	200,000	
		[a]$1,000,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

[As shown on p. 347, H. Doc. No. 421, 57th Cong., 2d sess.]

Missouri River to Meramec River, June 10, 1872	$100,000.00
Missouri River to Ohio River, March 3, 1873	200,000.00
Illinois River to Ohio River, June 23, 1874, to March 3, 1881	1,890,000.00
Since adoption of project:	
August 2, 1882	600,000.00
July 5, 1884	520,000.00
August 5, 1886	375,000.00
August 11, 1888	300,000.00
September 19, 1890	400,000.00
July 13, 1892	525,000.00
March 3, 1893	658,333.33
August 18, 1894	758,333.33
March 2, 1895	758,333.33
June 3, 1896	275,000.00
June 4, 1897	673,333.33
July 19, 1897	325,000.00
July 1, 1898	673,333.33
March 3, 1899	663,333.33
June 6, 1900	100,000.00
June 13, 1902	650,000.00
March 3, 1903	650,000.00
April 28, 1904	650,000.00
March 3, 1905	650,000.00
March 2, 1907	250,000.00
May 27, 1908	250,000.00
March 4, 1909	250,000.00
June 25, 1910	250,000.00
June 25, 1910	500,000.00
	13,894,999.98
Miscellaneous receipts, sales of property, etc	66,323.66
	13,961,323.64

CONTRACT IN FORCE.

Name: The Ohio River Contract Company.
Work: Dredging.
Cost: $13,500.
Date: September 9, 1909.
Date of commencement: Thirty days after notice of approval, September 21, 1909.
Date of completion: January 21, 1910.
Time limit waived for a reasonable period by the Chief of Engineers, U. S. Army, December 30, 1909 (E. D. file 72820/19).

COMMERCIAL STATISTICS, CALENDAR YEAR 1909.

Season of navigation.—Opened February 16, 1909; closed December 16, 1909.

Vessel classification, port of St. Louis, Mo.

Class.	American.	Net registered tonnage.	Passengers.
Unregistered steamers	99	15,219	511,576
Unregistered barges	4	1,447	....
Total	103	16,666	511,576

Freight traffic for calendar year 1909.

Article.[a]	Amount, in customary units.[a]	Amount, in short tons.[a]	Approximate valuation.[b]
Ale and beer	39,500 packages	2,469	$79,000.00
Bagging	2,950 rolls	221	29,500.00
Boots and shoes	49,260 cases	2,463	2,468,000.00
Coal		168,496	653,984.00
Coffee	13,310 sacks	1,098	332,750.00
Cotton	12,516 bales	3,130	625,800.00
Cotton seed and meal		433	10,825.00
Flour	13,775 barrels	1,377	68,875.00
Fruits	83,111 barrels and packages	5,323	249,324.00
Grain	226,321 sacks	16,458	595,863.00
Grain products	8,755 barrels and sacks	644	79,275.00
Hay and feed		921	15,000.00
Live stock	116,449 head	16,756	2,394,786.00
Live-stock products	3,257,175 pounds	1,629	356,606.50
Lumber and logs	16,604,000 feet	21,997	722,500.00
Manufactured iron, etc	2,047,700 pounds	1,024	50,204.00
Merchandise and sundries	921,010 packages	99,838	7,9[illegible]0,600.00
Molasses	500 barrels and kegs	78	11,540.00
Oils	2,390 barrels	478	7,170.00
Produce	502,270 pounds, 24,224 packages.	978	224,280.50
Salt	4,995 barrels	605	4,995.00
Soap	25,145 boxes	754	62,862.50
Sugar	9,055 barrels and 18,145 bags.	2,673	289,970.00
Tobacco, manufactured	228,900 pounds	174	114,450.00
Vegetables	52,065 sacks and barrels	5,224	137,135.00
White lead	2,171,600 pounds	1,085	130,296.00
Wines and liquors	4,005 barrels and packages	608	129,300.00
Wool	361,500 pounds	181	72,300.00
Total		352,055	17,852,191.50

[a] Compiled from St. Louis Merchants Exchange Annual Report, and reports of steamboat companies, for calendar year 1909.
[b] Estimated by engineer office, U. S. Army, St. Louis, Mo.

Average haul or distance freight was carried impracticable to furnish.

Rate per ton-mile (from tariff rates of steamboat companies): North of St. Louis, Mo., varies from 19.2 cents per ton-mile, class 1, between St. Louis and Alton, Ill., and 0.3 cent per ton-mile, class E, between St. Louis and St. Paul, Minn. (See following tables.) South of St. Louis, Mo., varies from 6⅔ cents per ton-mile, class 1, between St. Louis and certain way landings, and 0.48 cent per ton-mile, Class D, between St. Louis and Memphis, Tenn. (See following tables.)

Tariffs of the Diamond Jo Line steamers (local tariff).

Between St. Louis, Mo., and—	Distance.	Merchandise per 100 pounds.				In carloads per 100 pounds.					
		1.	2.	3.	4.	5.	A.	B.	C.	D.	E.
	Miles.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Alton, Ill	25	24	20	15	11	9½	9	8	8	6½	5½
Clarksville, Mo	99										
Louisiana, Mo	108										
Hannibal, Mo	136	26½	21½	17	12½	9½	9	8½	7½	6½	5½
Quincy, Ill	155	28	22½	17½	13½	10	9½	9	7½	7	6
La Grange, Mo	164	30	25	18	13	10	10	10	7½	7	6
Canton, Mo	170										
Warsaw, Ill	185										
Alexandria, Mo	188										
Keokuk, Iowa	192										
Nauvoo, Ill	206										
Fort Madison, Iowa	213										
Dallas City, Ill	221	30	25	18	13½	11	12	10	9	7½	6½
Burlington, Iowa	234										
Keithsburg, Ill	259	33	26	20	15	12	12	9	8	7½	7
New Boston, Mo	264										
Muscatine, Iowa	266										
Rock Island, Ill., and Davenport, Iowa	313										

Tariffs of the Diamond Jo Line steamers (local tariff)—Continued.

Between St. Louis, Mo., and—	Distance.	Merchandise per 100 pounds.				In carloads per 100 pounds.					
		1.	2.	3.	4.	5.	A.	B.	C.	D.	E.
	Miles.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Clinton, Iowa	349	33	26	20	15	12	12	10	9	8	8
Bellevue, Iowa	388										
Dubuque, Iowa	412										
Cassville, Wis	439	34	28	22	16	12	16	12	10	10	10
McGregor, Minn	467										
La Crosse, Wis	534										
Winona, Minn	560										
Wabasha, Minn	596	40	34	27	17	14	17	14	12	10	10
Lake City, Minn	608										
Red Wing, Minn	626										
Hastings and Prescott, Minn	649										
St. Paul, Minn	676										

Special grain, hay, and live stock tariff.

Between St. Louis, Mo., and—	Distance.	Any size lot per 100 pounds.				In carloads—dollars per car.			
		Wheat and rye.	Corn and oats.	Hay in bales.	Hay in ½ and ¼ bales, tight packed.	Horses and mules not exceeding 20 head.	Cattle not exceeding 20 head.	Hogs not exceeding 75 head.	Sheep not exceeding 90 head.
	Miles.								
Clarksville, Mo	99	7	6	10	8	$16	$16	$15	$12
Louisiana, Mo	108					16	16	15	12
Hannibal, Mo	136					20	19	16	13
Quincy, Ill	155					24	20	17	13
La Grange, Mo	164					25	21	17	13
Clinton, Mo	170					25	21	17	13
Alexandria, Mo	185					26	23	18	14
Warsaw, Ill	188					26	23	18	14
Keokuk, Iowa	192					26	23	18	14
Rate from and to any point not named on this tariff between St. Louis, Keokuk, and intermediate points	....	....	8	....	12½	....	....	....	....

Live stock will be carried between any two points named above at the following rates, unless existing local tariff makes less rate:

1 horse		[a]$3.00
2 horses	each	[a]2.50
3 to 5 horses	do	[a]2.00
Each additional over 5	do	[a]1.00
Hogs:		
10 head and under	do	.48
Over 10 and up to 35	do	.35
Over 35	do	.30
Calves	do	.75
Sheep:		
Under 20 head	do	.30
20 head or over	do	.25

[a] Applies also on mules or horned animals.

Special commodity tariff, in carloads of 24,000 pounds, unless otherwise specified.

Articles.	Between Burlington, Iowa, and St. Louis, Mo. (per 100 lbs.).	To Burlington, Iowa, from St. Louis, Mo. (per 100 lbs.).	From Alton, Ill., or St. Louis, Mo., to Burlington, Iowa (per 100 lbs.).
	Cents.	*Cents.*	*Cents.*
Canned fruit and vegetables (southbound only)	7½		
Common window glass	7½		
Iron and steel articles	7½		
Pickles and vinegar	7½		
Starch	6	9	
Bottles, glass, and fruit jars		8	8
Linters (cotton), 20,000 pounds or over		12	
Lumber		8	
Oil, linseed, in barrels		9	
Paper, roofing, strawboard and pitch		7	
Sugar		9	
Vinegar		bbl. 30	
White lead, red lead, and litharge		10	
Window shades (any quantity)		20	

Tariffs of the Lee Line steamers.

MERCHANDISE (PER 100 POUNDS).

	Between St. Louis, Mo., and—												
	Cairo, Ill.	Columbus, Ky.	Hickman, Ky.	New Madrid, Mo.	Tiptonville, Tenn.	Gayoso, Mo., Caruthersville, Mo., Tyler and Barfield, Ark.	Luxora, Ark., and Osceola, La.	Memphis, Tenn.	All way landings between Cairo and Memphis.	Helena, Ark., Friars Point, Miss., Arkansas City, Ark., Greenville, Miss., Lake Providence, La., Vicksburg, Miss.	All other points between Helena, Ark., and Vicksburg, Miss.	On Arkansas River—Pine Bluff and Little Rock, Ark.	All way points on Arkansas River to Pine Bluff.
Miles from St. Louis.	176	197	214	252	268	291 to 318	341	421	176 to 421	511 to 830	511 to 830	508 to 575	508
Class 1	$0.25	$0.30	$0.30	$0.40	$0.60	$0.48	$0.53	$0.50	$0.60	$0.60	$0.90	$0.60	$1.10
Class 2	.20	.22½	.25	.29	.50	.38	.41	.37½	.50	.50	.75	.50	.87½
Class 3	.18	.18	.22½	.27	.45	.33	.38	.33	.45	.45	.60	.40	.73
Class 4	.14	.14	.18½	.22	.40	.27	.30	.27	.40	.35	.50	.30	.57
Class 5	.10	.14	.15	.18	.32	.23	.23	.22½	.35	.30	.45	.23	.42½
Class 6	.10	.12	.14		.25			.19	.30	.25	.40		
Class 7	.09							.12	.25	.20	.30		
Class 8	.08												
Class 9	.07												
Class 10	.06												
Class A		.10	.10	.19	.22½	.24	.24					.25	.30½
Class B								.11					
Class C								.11					
Class D								.10					
Class E								.16					
Class F								.22½					
Class H								.28					

Tariffs of the Lee Line steamers—Continued.

HORSES AND MULES (EACH).

	Between St. Louis, Mo., and—												
	Cairo, Ill.	Columbus, Ky.	Hickman, Ky.	New Madrid, Mo.	Tiptonville, Tenn.	Gayoso, Mo., Caruthersville, Mo., Tyler and Barfield, Ark.	Luxora, Ark., and Osceola, La.	Memphis, Tenn.	All way landings between Cairo and Memphis.	Helena, Ark., Friars Point, Miss., Arkansas City, Ark., Greenville, Miss., Lake Providence, La., Vicksburg, Miss.	All other points between Helena, Ark., and Vicksburg, Miss.	On Arkansas River—Pine Bluff and Little Rock, Ark.	All way points on Arkansas River to Pine Bluff.
Miles from St. Louis.	176	197	214	252	268	291 to 318	341	421	176 to 421	511 to 830	511 to 830	508 to 575	508
1 head	$4.00	$5.00	$5.00	$6.00	$7.50	$7.00	$7.50	$7.50	$7.50	......	......	......	......
2 head	3.75	4.50	4.50	5.00	7.00	6.00	7.00	7.00	7.00	......	......	......	......
3 head	3.50	4.25	4.25	5.00	6.50	5.50	6.50	6.50	6.50	......	......	......	......
4 head	3.25	4.00	4.00	5.00	6.00	5.25	6.00	6.00	6.00	......	......	......	......
5 head	3.00	3.75	3.75	4.00	5.50	5.00	5.50	5.50	5.50	......	......	......	......
6 head	2.75	3.50	3.50	3.50	5.00	4.75	5.00	5.00	5.00	......	......	......	......
7 head	2.50	3.50	3.50	3.50	4.50	4.50	4.50	4.50	4.50	......	......	......	......
8 head	2.25	3.50	3.50	3.50	4.25	4.25	4.25	4.25	4.25	......	......	......	......
9 head	2.00	3.25	3.25	3.00	4.00	4.00	4.00	4.00	4.00	......	......	......	......
10 head	1.75	3.00	3.00	3.00	3.75	3.75	3.75	3.50	3.75	......	......	......	......
11 head	1.50	2.75	2.75	2.50	3.50	3.50	3.50	3.25	3.50	......	......	......	......
12 head	1.50	2.50	2.50	2.25	3.50	3.50	3.50	3.00	3.50	......	......	......	......
13 head	1.50	2.25	2.25	2.00	3.25	3.25	3.25	2.65	3.25	......	......	......	......
14 head	1.50	2.00	2.00	2.00	3.25	3.25	3.25	2.50	3.25	......	......	......	......
15 head	1.50	2.00	2.00	......	3.00	......	3.00	2.40	3.00	......	......	......	......
16 head	......	......	......	......	3.00	......	3.00	2.25	3.00	......	......	......	......
17 head	......	......	......	......	3.00	......	3.00	2.00	3.00	......	......	......	......
18 head	......	......	......	......	2.75	......	3.00	1.90	3.00	......	......	......	......
19 head	......	......	......	......	2.65	......	3.00	1.80	3.00	......	......	......	......
20 head	......	......	......	......	2.50	......	3.00	[a]36.00	3.00	......	......	......	......
20 head and over	......	......	......	......	(b)	......	......	......	......	......	......	......	......
21 head and over	......	......	......	......	......	......	(b)	......	......	......	......	......	......
22 head	......	......	......	......	......	......	......	......	3.00	......	......	......	......
23 head	......	......	......	......	......	......	......	......	3.00	......	......	......	......
24 head	......	......	......	......	......	......	......	......	3.00	......	......	......	......
15 to 24 head	......	......	......	......	......	3.00	......	......	......	......	......	......	......
15 to 25 head	......	......	......	[a]30.00	......	......	......	......	......	......	......	......	......
16 to 20 head	[a]25.00	[a]30.00	[a]30.00	......	......	......	......	......	......	......	......	......	......
25 head and over	......	......	......	......	......	2.50	......	(b)	2.50	......	......	......	......

CATTLE (EACH).

1 head	$4.00	$4.00	$5.00	$5.00	......	$4.00	$5.00	$7.00	$7.50	......	......	......	......
2 head	3.75	3.75	4.50	4.00	......	3.75	4.00	6.50	7.00	......	......	......	......
3 head	3.50	3.50	4.25	4.00	......	3.50	4.00	6.00	6.50	......	......	......	......
4 head	3.25	3.50	4.00	4.00	......	3.25	4.00	5.50	6.00	......	......	......	......
5 head	3.00	3.25	3.75	3.50	......	3.25	3.75	5.00	5.50	......	......	......	......
6 head	2.75	3.25	3.50	3.50	......	3.25	3.75	4.50	5.00	......	......	......	......
7 head	2.50	3.25	3.50	3.50	......	3.25	3.75	4.00	4.50	......	......	......	......
8 head	2.25	3.25	3.50	3.50	......	3.00	3.75	3.75	4.25	......	......	......	......
9 head	2.00	3.25	3.25	3.00	......	3.00	3.50	3.50	4.00	......	......	......	......
10 head	1.75	3.00	3.00	3.00	......	3.00	3.50	3.00	3.75	......	......	......	......
11 head	1.50	2.75	2.75	2.50	......	3.00	3.25	2.75	3.50	......	......	......	......
12 head	1.50	2.50	2.50	2.25	......	3.00	3.25	2.60	3.50	......	......	......	......
13 head	1.50	2.25	2.25	2.00	......	2.75	3.00	2.45	3.25	......	......	......	......
14 head	1.50	2.00	2.00	2.00	......	2.75	3.00	2.30	3.25	......	......	......	......
15 head	1.50	2.00	2.00	......	......	......	......	2.15	......	......	......	......	......
16 head	......	......	......	......	......	......	......	2.00	......	......	......	......	......

[a] Lot.

[b] Contract.

Tariffs of the Lee Line steamers—Continued.

CATTLE (EACH)—continued.

	Between St. Louis, Mo., and—												
	Cairo, Ill.	Columbus, Ky.	Hickman, Ky.	New Madrid, Mo.	Tiptonville, Tenn.	Gayoso, Mo., Caruthersville, Mo., Tyler and Barfield, Ark.	Luxora, Ark., and Osceola, La.	Memphis, Tenn.	All way landings between Cairo and Memphis.	Helena, Ark., Friars Point, Miss., Arkansas City, Ark., Greenville, Miss., Lake Providence, La., Vicksburg, Miss.	All other points between Helena, Ark., and Vicksburg, Miss.	On Arkansas River—Pine Bluff and Little Rock, Ark.	All way points on Arkansas River to Pine Bluff.
Miles from St. Louis.	176	197	216	252	268	291 to 318	341	421	176 to 421	511 to 830	511 to 830	508 to 575	508
17 head								$1.85					
18 head								1.75					
19 head								1.65					
15 to 24 head							$2.75		$3.00				
15 to 25 head				[a]$30.00									
20 to 24 head								[a]32.00					
25 head and over						$2.25	2.25		2.50				
16 to 20 head	[a]$25.00	[a]$30.00	[a]$30.00										

[a] Lot.

HOGS (EACH).

1 head	$0.50	$0.50	$0.50	$0.50	$0.60	$0.60	$0.60	$0.60	$0.60				
5 head and over	.40												
50 to 100 head					.50	.50	.50	.50	.50				
100 head and over					.40								

Rates per ton-mile to typical points above St. Louis by Diamond Jo Line steamers.

Between St. Louis and—	Distance.	Merchandise.				In car loads.					
		Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class A.	Class B.	Class C.	Class D.	Class E.
	Miles.										
Alton, Ill	25	$0.192	$0.160	$0.120	$0.088	$0.076	$0.072	$0.064	$0.064	$0.052	$0.044
Louisiana, Mo	108	.044	.037	.028	.022	.018	.017	.015	.015	.012	.010
Hannibal, Mo	136	.039	.032	.025	.018	.014	.013	.012	.011	.010	.008
Quincy, Ill	155	.036	.035	.023	.016	.013	.012	.012	.010	.009	.008
Canton, Mo	170	.035	.029	.021	.015	.012	.012	.012	.009	.008	.007
Fort Madison, Iowa	213	.028	.023	.017	.012	.009	.009	.009	.0070	.0066	.0056
Burlington, Iowa	234	.026	.021	.015	.012	.009	.010	.009	.0077	.0064	.0056
Keithsburg, Ill	259	.025	.020	.015	.012	.009	.009	.007	.0061	.0058	.0054
Rock Island, Ill., and Davenport, Iowa	313	.021	.017	.013	.010	.008	.008	.006	.0051	.0048	.0045
Clinton, Iowa	349	.019	.015	.011	.009	.007	.007	.006	.0051	.0046	.0046
Dubuque, Iowa	412	.016	.013	.010	.007	.006	.006	.005	.0044	.0039	.0039
Cassville, Wis	439	.015	.013	.010	.007	.005	.007	.005	.0045	.0045	.0045
Winona, Minn	560	.012	.010	.008	.006	.004	.006	.004	.0036	.0036	.0036
Wabasha, Minn	596	.013	.011	.009	.006	.005	.006	.005	.0040	.0033	.0033
St. Paul, Minn	676	.012	.010	.008	.005	.004	.005	.004	.0035	.0030	.0030

Rates per ton-mile to typical points below St. Louis by Lee Line steamers.

Between St. Louis and—	Distance.	Merchandise.				In car loads.					
		Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class 6.	Class 7.	Class A.	Classes B and C.	Class D.
	Miles.										
Cairo, Ill	176	$0.028	$0.023	$0.020	$0.016	$0.011	$0.011	$0.010	......	......	......
Columbus, Ky	197	.030	.023	.018	.014	.014	.012	......	$0.010	......	......
Hickman, Ky	214	.028	.023	.021	.017	.014	.013	......	.009	......	......
New Madrid, Mo	252	.032	.023	.021	.017	.014	......	......	.015	......	......
Tiptonville, Tenn	268	.045	.037	.034	.030	.024	.018	......	.017	......	......
Gayoso, Mo	291	.033	.026	.023	.019	.016	......	......	.017	......	......
Barfield, Ark	318	.030	.024	.021	.017	.014	......	......	.015	......	......
Luxora and Osceola, Ark	341	.031	.024	.022	.018	.014	......	......	.014	......	......
Memphis, Tenn	421	.024	.018	.016	.013	.011	.009	.006	......	$0.0052	$0.0048
Helena, Ark	511	.023	.020	.018	.014	.011	.010	.008	......	......	......
Vicksburg, Miss	830	.014	.012	.011	.008	.007	.006	.005	......	......	......
On Arkansas River:											
Pine Bluff, Ark	508	.023	.020	.016	.012	.009	......	......	.010	......	......
Little Rock, Ark	575	.021	.017	.014	.010	.008	......	......	.009	......	......

Total cost and work done to June 30, 1910.

	New.		Completion or restoration (linear feet).	Ordinary repairs.			Total cost.
	Linear feet.	Square feet.		Linear feet.	Square feet.	Cost.	
Hurdles:							
Prior to July 1, 1909	372.528	....	22,061	84,500	....	....	$6,855,710.70
During fiscal year ending June 30, 1910	....	....	....	....	....	....	....
Total	372,528	....	22,061	84,500	....	....	6,855,710.70
Bank protection (mattress and revetment) prior to July 1, 1909	304,043	52,473,309	....	....	5,096,868	....	3,616,662.72
Mattress during fiscal year ending June 30, 1910:							
Pulltight, Ill	....	....	....	....	126,535	13,038.35	65,603.99
Chesley Island, Mo	....	....	....	....	80,350	7,411.88	
Foster Island, Ill	....	....	....	....	85,245	6,480.61	
Forest Home, Ill	....	....	....	....	52,650	5,654.44	
Chester, Mo. (Horse Island)	....	....	....	....	52,460	2,573.22	
Crain Island, Mo	....	....	....	....	71,500	6,227.26	
Liberty, Ill	....	....	....	....	17,530	4,966.64	
Revetment during fiscal year ending June 30, 1910:							
Pulltight, Ill	....	....	....	....	39,860	2,307.34	
Chesley Island, Mo	....	....	....	....	47,510	2,878.94	
Foster Island, Ill	....	....	....	....	33,360	1,410.38	
Forest Home, Ill	....	....	....	....	38,770	2,260.99	
Chester, Mo. (Horse Island)	....	....	....	....	16,450	1,180.50	
Crain Island, Mo	....	....	....	....	99,981	5,612.33	
Liberty, Ill	....	....	....	....	64,820	3,601.11	
	....	....	....	....	....	....	3,682,266.71
Dikes and dams prior to July 1, 1909	28,671	....	....	810	....	....	691,893.46
Jetties prior to July 1, 1909	....	....	....	....	....	....	114,603.53
Dredging:							
Prior to July 1, 1909	....	....	....	....	....	....	798,047.37
During fiscal year ending June 30, 1910	....	....	....	....	....	....	190,159.42
Total	....	....	....	....	....	....	988,206.79
Surveys, examinations, gauges, etc.:							
Prior to July 1, 1909	....	....	....	....	....	....	295,262.80
During fiscal year ending June 30, 1910	....	....	....	....	....	....	8,672.67
Total	....	....	....	....	....	....	303,935.47

RECAPITULATION.

Hurdles	$6, 855, 710. 70
Bank protection	3, 682, 266. 71
Dikes and dams	691, 893. 46
Jetties	114, 603. 53
Dredging	988, 206. 79
Surveys, examinations, gauges, etc	303, 935. 47
Total	12, 636, 616. 66

Property account.

	Value July 1, 1909.	Debits.	Credits.	Value June 30, 1910.
Steamer Gen. J. H. Simpson	$12,582.15	$953.79	$2,464.63	$11,071.31
Steamer Wm. R. King	48,327.74	22,693.73	24,196.04	46,825.43
Dredge No. 3	78,716.49	22,330.67	22,816.66	78,230.50
Dredge No. 4	76,399.39	25,745.82	30,261.02	71,894.19
Dredge No. 5	177,978.98	22,901.69	32,865.17	168,015.50
Dredge No. 6	176,795.56	25,413.11	34,892.69	167,315.98
Steam tenders, wood, 5	12,915.07	1,365.48	3,176.33	11,104.22
Steam tenders, steel, 3	37,857.35	3,127.46	4,360.55	36,624.26
Barges, model, 49	66,771.23	2,418.61	12,531.19	56,658.65
Barge, flat, 1	2,064.29	58.75	348.19	1,774.85
Store boat, 1	1,023.63	1,536.54	271.61	2,288.56
Quarter boats, 10	19,585.68	4,337.36	3,287.18	20,635.86
Office and survey boats, 5	7,389.94	3,741.34	1,799.12	9,332.16
Pile drivers, 16	13,694.68	2,827.13	4,804.30	11,717.51
Derrick boats, 2	3,909.85		564.75	3,345.10
Derricks, 2	972.67		140.45	832.22
Machine boat, 1		2,379.59	178.47	2,201.12
Flats, wood, 60	7,220.22	1,345.58	2,388.00	6,177.80
Flats, steel, 8	9,666.13	36.63	607.89	9,094.87
Small boats, 84	1,376.33	1,149.54	1,348.25	1,177.62
Portable quarters, 29 sec	640.28	54.00	146.44	547.84
Jetty gates	2,531.12		1,368.82	1,162.30
Engineer depot	14,848.54	5,303.78	7,447.57	12,704.75
Tools and appliances	12,614.60	5,276.65	6,028.75	11,862.50
Boarding outfit	10,764.62	1,957.87	3,291.99	9,430.50
Office furniture	1,067.01	306.35	177.02	1,196.34
Survey instruments	697.18		100.65	596.53
Total	798,410.73	157,261.47	201,863.73	753,808.47

Material account.

	Value July 1, 1909.	Debits.	Credits.	Value June 30, 1910.
Subsistence	$332.99	$27,183.89	$26,508.58	$1,008.30
Brush		7,169.27	7,169.27	
Piles	3,738.11	393.00	3,519.67	611.44
Stone, United States quarry		1,200.00	1,200.00	
Stone, contract		18,254.53	18,254.53	
Rope	20,501.01	4,236.91	3,184.47	21,553.45
Wire	354.14		238.50	115.64
Iron	8,232.60	3,563.96	3,030.95	8,765.61
Nails	254.88	151.38	140.33	265.93
Spikes	471.95	46.00	85.02	432.93
Lumber	6,656.89	3,222.13	4,581.13	5,297.89
Oakum	293.48	450.00	375.53	367.95
Coal	1,297.21	34,201.43	33,875.49	1,623.15
Ice		1,352.07	1,345.50	6.57
Material, miscellaneous	9,881.65	11,637.04	12,107.02	9,411.67
Total	52,014.91	113,061.61	115,615.99	49,460.53

Engineer Office, U. S. Army, in account with United States, from 1870 to June 30, 1910.

To allotments, appropriations, etc., prior to June 30, 1910:		
1872–1907, allotments for surveys	$55, 483. 77	
1876–1897, special appropriations	401, 600. 00	
1879–1910, miscellaneous receipts	68, 728. 64	
1872–1910, appropriations for general improvement	13, 894, 999. 98	
		$14, 420, 812. 39
June 30, 1910:		
Unpaid percentages	4, 253. 24	
Unpaid labor	12, 836. 86	
Unpaid miscellaneous	3, 083. 47	
		20, 173. 57
		14, 440, 985. 96
By construction between Illinois and Missouri rivers—		
Piasa Island dam	37, 910. 41	
Piasa Island dam, cutting channel	3, 116. 86	
Alton dam	8, 740. 05	
Alton dike	126, 652. 74	
		176, 420. 06
By construction between Ohio and Missouri rivers—		
Hurdles	6, 855, 710. 70	
Bank protection	3, 682, 266. 71	
Dikes and dams	691, 893. 46	
Jetties	114, 603. 53	
Dredging	988, 206. 79	
Surveys	303, 935. 47	
		12, 636, 616. 66
By removing obstructions, Beaver Dam rock	9, 773. 75	
Board on examination and survey of Mississippi River	11, 610. 51	
Withdrawn for office of Chief of Engineers	2, 220. 50	
Withdrawn for Board of Engineers for Rivers and Harbors	800. 00	
Mississippi River Commission (Memphis)	7, 229. 50	
Mississippi River Commission (secretary's office)	2, 625. 46	
Isthmian Canal Commission (inspections)	459. 40	
Removing obstructions in Mississippi River	7, 353. 40	
Expended by Auditor for War Department	47. 89	
Property on hand	753, 808. 47	
Material on hand	49, 460. 53	
Appropriations unexpended, Mississippi River, Ohio to Missouri rivers	782, 559. 83	
		1, 627, 949. 24
		14, 440, 985. 96

APPENDIX Y.

IMPROVEMENT OF RIVERS AND HARBORS IN THE ROCK ISLAND, ILLINOIS, DISTRICT.

REPORT OF MAJ. CHARLES KELLER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Operating snag boats and dredge boats on upper Mississippi River and tributaries.
2. Mississippi River between mouth of Missouri River and Minneapolis; between Missouri River and St. Paul.
3. Operating and care of Des Moines Rapids Canal and Dry Dock.
4. Mississippi River at Moline, Illinois.
5. Operating and care of Mississippi River improvement at Moline, Illinois.
6. Operating and care of Milan section of Illinois and Mississippi Canal.
7. Illinois and Mississippi Canal; improvement of Rock River pool.
8. Operating and care of Galena River improvement, Illinois.

UNITED STATES ENGINEER OFFICE,
Rock Island, Ill., July 19, 1910.

SIR: I have the honor to transmit the annual report on work in this district for fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

CHARLES KELLER,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY..

Y 1.

OPERATING SNAG BOATS AND DREDGE BOATS ON THE UPPER MISSISSIPPI RIVER AND TRIBUTARIES.

The work performed under this appropriation consists chiefly in the removal of snags, wrecks, rocks, and other obstructions to navigation. The operations extend from Minneapolis to the mouth of the Missouri River, a distance of 670 miles, and on the Illinois River from its mouth to La Salle, 223 miles. Work will also be performed in the improved or partially improved portions of the Minnesota, St. Croix, Chippewa, Black, Galena, and Rock rivers.

There belongs to this work the snag boat *David Tipton* (formerly the *Col. A. Mackenzie*), built in 1900, but dredges, drill boats, and tenders are borrowed from other works when required.

Snag-boat and dredge-boat operations are, and have been for the past thirty-four years, in local charge of Principal Assistant Engineer C. W. Durham, from whose report the following details are taken:

During the past year the snag boat was employed from July 1 to December 12, 1909, and from April 1 to June 30, 1910, in removing snags and other obstructions, making surveys and inspections, and otherwise assisting the interests of navigation on the upper Mississippi River between Minneapolis and the mouth of the Missouri River, on the Illinois River between its mouth and La Salle, and on the lower portions of the Minnesota and St. Croix rivers. On November 6, 1909, the National Waterways Commission were taken on board at St. Paul and were carried to New Orleans, where the boat arrived on November 16. The expenses of this trip below St. Louis were paid from the snag-boat appropriation for the lower Mississippi.

Summary.

Designation.	Mississippi River.	Illinois River.	Minnesota River.	St. Croix River.	Total.
Snags removed	214	21	8	30	268
Piles removed	30	18			48
Stumps destroyed	92		2		94
Leaning trees pulled back	394		256		650
Large cuts (over 8 inches diameter)	1,256	19	782		2,057
Small cuts (under 8 inches diameter)	1,208	17	887		2,112
Wrecks removed	2				2
Buoys placed	1				1
Mooring chains placed	5				5
Mooring rock pulled back on levee	4				4
Miles run light	8,557	842	52	116	9,567

The total tonnage of the Mississippi River between the Falls of St. Anthony and mouth of Missouri River for the calendar year 1909 was approximately 1,916,904 tons, and the ton-miles 131,290,621. This includes logs, lumber, and United States material.

ABSTRACT OF APPROPRIATIONS AND ALLOTMENTS.

There has been appropriated or allotted, under various acts, from March 2, 1867, to June 30, 1902, inclusive (H. Doc. No. 421, 57th Cong., 2d sess.), for operating snag boats and dredge boats on the upper Mississippi River	$874,584
Fiscal year ending—	
June 30, 1903	25,000
June 30, 1904	25,000
June 30, 1905	25,000
June 30, 1906	25,000
June 30, 1907	25,000
June 30, 1908	25,000
June 30, 1909	25,000
June 30, 1910	25,000
Total	1,074,584

STATISTICS OF COMMERCE AND NAVIGATION.

Lumber.—The most important business at present carried on in connection with the navigation of the upper Mississippi River and its principal tributaries is the lumber trade which, although rapidly declining, owing to the deforestation of the available pine forests in Wisconsin and Minnesota, gave employment in 1909 to 11 raft boats, which distributed logs from the upper waters to the various mills scattered along the river from Minneapolis to Keokuk, and also brought down, chiefly to points below the Des Moines Rapids, much lumber from the St. Croix River. The manufacture of these mills in 1909 was, white pine lumber 174,730,000 feet b. m.

Northern pine and hemlock manufacture in 1909, in Minnesota, Wisconsin, and Iowa.

State.	White pine (M feet, b. m.).	Hemlock (M feet, b. m.).	Shingles (M).	Lath (M).
Minnesota	1,283,926	20,617	72,511	284,489
Wisconsin	678,278	629,436	392,581	302.484
Iowa	79,080	2,300	5,500	17,220
Total	2,041,284	652,353	470,592	604,193

The pine forests are practically destroyed in the State of Wisconsin and hemlock manufacture is increasing.

Lumber manufacture, upper Mississippi Valley, 1909 (incomplete).

[Value about $10,000,000.]

Locality.	Lumber.	Shingles.	Lath.
	Feet b. m.	*Number.*	*Number.*
Above Minneapolis	120,100.000	11,982,000	15,832.000
Minneapolis	88.190,000	1.900.000	1,350,000
St. Paul to Missouri River	86.540,000	5.500,000	24,072,000
St. Croix River	88,053,000	7,064.000	19,679,000
Chippewa River	35,230,000	2,300.000	23,917,000
Total	418,113,000	34,746,000	84,850,000

Steamboats and freight.—There were employed between Minneapolis and St. Louis during 1909, 11 raft boats, 22 packets, 36 towboats, 17 ferryboats, 147 pleasure boats, and 26 government boats; in all, 259 vessels, with a gross tonnage of about 16,103 tons. In addition to the above there are about 300 unregistered barges of various sizes used for transporting freight and construction material. The principal steamboat lines on the upper Mississippi River are the Diamond Jo, the Eagle, the Carnival City, and the Acme. The number of passengers carried by all boats (including the ferries, 1,042,880) in 1909 was 2,405,198. The quantity of freight carried by all boats, including the rock and brush loaded on barges and used in government work, and also including logs and lumber floated down the stream, is shown in the following table, together with the ton-miles and approximate valuation:

Upper Mississippi River freight statement for 1909.

Designation.	Tons.	Ton-miles.	Valuation.
Logs	389,430	97,357,500	$2,003.257
Rafted lumber, shingles, etc	29,621	10,230.710	387,530
Miscellaneous freight	1,278,429	21,277,535	22,795,668
Government material	218,634	2,424,876	168,069
Total	1,916,114	131,290,621	25,354,524

List of steamboats, barges, and rafts passing through various bridges, 1909.

Locality of bridge.	Miles from St. Paul.	Steamboats.		Barges.		Rafts.
		Up.	Down.	Up.	Down.	Down.
St. Paul Park	11	523	525	58	63	[a]169
Hastings	28	518	511	45	47	[b]340
Prescott	30	742	742	96	109	[c]472
Reads	78	350	356	173	204	76
Winona	116	636	634	236	265	[d]204
La Crosse	143	426	413	141	174	90
Dubuque	265	212	296	279	318	78
Sabula	310	215	211	108	134	72
Clinton	327	684	696	351	362	[e]15
Rock Island	363	418	429	271	282	62
Keithsburg	417	310	274	13	13	48
Burlington	441	457	460	78	75	51
Fort Madison	462	487	480	87	73	49
Keokuk	484	536	537	131	131	13
Quincy	521	448	454	170	175	[e]4
Hannibal	540	181	184	99	97	11
Lousiana	568	335	335	223	222	[f]26
Alton	652	838	851	53	64	4

[a] Four brails half rafts.
[b] Pieces about one-fourth of a full raft.
[c] Pieces into Lake St. Croix and out again.
[d] Half rafts.
[e] Partial record.
[f] Mostly small rafts of cottonwood logs.

Internal revenue for the year ending December 31, 1909, collected in districts bordering on the upper Mississippi River.

District.	Office.	Amount.
Minnesota	St. Paul	$1,918,796.10
Second Wisconsin	Madison	996,866.50
Third Iowa	Dubuque	426.553.85
Fourth Iowa	Burlington	524,838.31
Fifth Illinois	Peoria	29,367,583.47
Eighth Illinois	Springfield	6,798,845.68
Thirteenth Illinois	East St. Louis	485,213.91
First Missouri	St. Louis	8.053,009.92
Total		48,571,707.74

Customs revenue and tonnage for the year ending December 31, 1909.

Port.	Collections.	Gross tonnage enrolled.	Vessels.
St. Paul, Minn		2,630	45
La Crosse, Wis	$48.92	1,373	25
Dubuque, Iowa	18,645.12	380	17
Rock Island, Ill	15.25	5,751	130
Burlington, Iowa	82.62	1,221	20
St. Louis, Mo.[a]	2,424,538.51	21,797	119
Total	2,443,330.42	33,152	356

[a] Only a part of the St. Louis statement is applicable to the upper Mississippi.

The methods heretofore employed by this office in collection of commercial statistics do not permit giving the information desired in recent form furnished by the department and in the item of the current river and harbor act, except as above, and in the data furnished for the report of the Chief of Engineers.

Summary of expenditures for operating snag boats and dredge boats on upper Mississippi River for fiscal year ending June 30, 1910.

Month.	Office expenses, superintendence, and contingencies.	Care, repair, and operating snag boats and dredge boats.						Grand total.
		Labor.	Subsistence.	Fuel.	Expense.	Repairs.	Total.	
1909.								
July	$2.20	$1,614.84	$362.75	$372.43	$71.59		$2,421.61	$2,423.81
August	46.75	1,551.83	513.03	342.49	637.69	$78.77	3,123.81	3,170.56
September	135.18	1,551.00	318.30	211.30	548.34	87.66	2,716.60	2,851.78
October	51.13	1,560.33	456.40	767.65	310.68	470.65	3,565.71	3,616.84
November	67.61	175.00				63.04	238.04	305.65
December	88.27	1,014.83			65.03	209.78	1,289.64	1,377.91
1910.								
January	39.06	380.00			8.40		388.40	427.46
February	147.59	342.67				304.73	647.40	794.99
March	172.21	340.00	20.00			120.44	480.44	652.65
April		1,285.00	604.40	274.85	206.08		2,370.33	2,370.33
May		1,485.00	429.34	618.40	610.33		3,143.07	3,143.07
June		842.65	295.24	952.25	947.88	826.93	3,864.95	3,864.95
Total	750.00	12,143.15	2,999.46	3,539.37	3,406.02	2,162.00	24,250.00	25,000.00

Y 2.

IMPROVEMENT OF MISSISSIPPI RIVER BETWEEN MOUTH OF MISSOURI RIVER AND MINNEAPOLIS, MINNESOTA—BETWEEN MISSOURI RIVER AND ST. PAUL.

The balance available July 1, 1910, will be applied at the various localities indicated in the annual project, in the construction of dams and shore protections, and in auxiliary dredging, both by hired labor and contract.

The work will be done in accordance with the 6-foot channel project adopted by Congress March 2, 1907, the estimate for which is on page 1559, Report of Chief of Engineers for 1907. The full project is published in Document No. 341, Fifty-ninth Congress, second session.

GENERAL IMPROVEMENT.

St. Paul to Winona, 116 miles.—By hired labor and use of government plant work was carried on in 1909 from July 6 to October 10 in vicinity of Alma (miles 89 to 91 from St. Paul), at mouth of Zumbro River (mile 97), and opposite Fountain City (mile 109). At the named localities 5 dams were built, 7 dams were lengthened and repaired, 775 linear feet of shore protection were built, and 2 pieces of shore protection were repaired. All dams were built to a crest elevation of 4 feet at low water.

In the above-mentioned work 15,304.8 cubic yards of rock and 35,292.5 cubic yards of brush were put in place at a cost of $0.814 per cubic yard, including superintendence, office expenses, and plant charges.

The construction plant was laid up for the winter in Fountain City Bay.

U. S. hydraulic dredge *Pelee* was employed from August 24 to October 1, 1909, in removing sand from the channel in vicinity of Alma and depositing the spoil in deep holes at ends of the wing dams it was proposed to lengthen, thereby saving in cost of construction. About 49,204 cubic yards of sand were dredged and removed from channel in vicinity of Alma. On October 1 the dredge was taken to Hastings (miles 28–29) and was employed during remainder of season in opening the channel below the bridge. A cut, 2,025 feet long and from 85 to 90 feet wide, with an average depth of 7 feet, was made, the sand removed amounting to 24,578 cubic yards. This was difficult dredging, as the bar consisted of compact sand and gravel, with scattering clam shells, nigger heads, and pieces of flat rock and shale. The operations ceased on November 7, and the dredging plant was then laid up for the winter at South Stillwater. The cost of the dredging for the season, 73,782 cubic yards, was $5,487.81, or $0.074 per cubic yard, including all charges.

Assistant Engineer J. D. DuShane, in local charge of this division, says:

> The work of building dams and shore protections should, unless something more urgent develops, begin where left off at close of season below Alma. Other places where work should be done during the coming season are West Newton and Island 55. Dredging should be continued at Hastings and in connection with construction of dams below Alma.

At the United States boat yard, South Stillwater, during 1909, dredge *Pelee*, 23 rock barges, 1 building boat, 1 store boat, and 2 coal flats were built. All lumber used was creosoted by the open-tank process.

In 1910 dredge *Pelee* was employed during portions of May and June in dredging at West Newton and Island 65.

Winona to Wisconsin River, 95 miles.—All work was done by hired labor and government plant, except some winter work in the repairs of 3 closing dams, which was done by contract.

Operations were carried on in 1909 from August 2 to October 26, between Homer and La Moille (miles 121–126), and resulted in the repair and lengthening of 21 dams. One dam was built and 167 linear feet of shore protection. All dams were built to a crest elevation of 5 feet above low water, so as not to be less than 4 feet after shrinkage and settlement.

The construction plant was laid up for the winter in Fountain City Bay.

There were put in place by hired labor 16,584.8 cubic yards rock (all of which was furnished by the United States quarry at La Moille) and 43,850 cubic yards of brush, at a cost of $0.85 per cubic yard, including all charges.

During the season of 1909 surveys of the river were made from Winona to Queens Bluff, between the two La Crosse bridges, and of La Crosse Harbor.

At the Fountain City boat yard repairs were made by hired labor to a large number of pieces of floating plant. There were built or completed during the year 2 coal flats, 12 barges, 1 store boat, 2 grass hoppers, and 1 building boat.

Assistant Engineer W. A. Thompson, in local charge of this division, says:

> The cause of the high cost of construction work and of quarrying rock was principally the short season of operations, only about ten weeks of actual work. The fixed charges for each year must be carried and charged to the work performed, and they are practically the same for a long as for a short season.

In 1910, to June 30, some small detached surveys were made.

Wisconsin River to Le Claire, 136 miles.—A large part of the work in this division was performed by hired labor and use of government plant, and the remainder by contract.

Construction work by hired labor commenced April 1 and closed for the season November 13, 1909, when the fleet was laid up for the winter in the ice harbor at Dubuque. A small force was, however, employed during February in making repairs to Dam 21 in Cassville Slough, and 334 piles were driven in Dam 22 later in the season, the cost of the latter work being $2,416.

The hired labor work resulted in building 7,079 linear feet of shore protection and repairing 5 wing and 2 closing dams in vicinity of Cassville Slough, Eagle Point, Harris Slough, and above Savanna.

There were put in place in the above work 18,445.3 cubic yards of rock and 21,159.2 cubic yards of brush, at a cost, including all charges, of $1.031 per cubic yard.

Under contract with A. J. Whitney, approved June 2, 1908, work at Cassville Slough was begun April 17, 1909, and continued until completion of contract, June 25. Two dams were repaired, 1 completed, and 1 begun.

There were put in place during the season, under this contract, 2,469.3 cubic yards of rock and 5,661 cubic yards of brush; during the life of the contract 14,264.7 cubic yards of rock and 20,426.8 cubic yards of brush were put in place, at a cost, including inspection and all other charges, of $0.943 per cubic yard.

Large repairs to plant were made at the Dubuque boat yard; 1 grasshopper was built and 3 barges were rebuilt. All lumber was creosoted by open tank process.

Hydraulic dredge *Vesuvius* removed 5,779 cubic yards of sand from channel at mouth of Harris Slough, August 23 to 27, 1909. Dredge *Phoenix* commenced operations August 19, and continued until September 21, removing a piece of old shore protection at Island 232, and dredging landing places at East Dubuque and Clinton. The entire cost of dredging was $1,968.40.

Assistant Engineer S. Edwards, in local charge of this division, says that "the work above Eagle Point should be attacked as soon as possible, it being the worst locality in the division."

In 1910, to June 30, a few days' dredging was done by dredge *Vesuvius* at Eagle Point Landing, and a small party made detached surveys at various localities in May and June.

Rock Island Rapids, miles 348-364.—Work on the 6-foot channel, in excavation and removal of rock, was carried on in 1909 in vicinity of Moline, by hired labor and the use of U. S. drill boat *No. 103*, with double crew, which operated from April 9 to November 10; dipper dredge *Vulcan* worked for the greater part of the time from July 23 to November 3; dipper dredge *Apache* from April 12 to November 20, and dipper dredge *Phoenix* from April 15 to August 17. The dipper dredges had single crews.

Assistant Engineer J. B. Bassett, in local charge of this division, says:

> Sweeping the dredged portions of the channel by means of a spud boat and a suspended steel rail, progressed during the season when necessary. The results of the season's work were, to some extent, disappointing. It was hoped to be able to open for navigation a through channel of about 125 feet width. All rock in such a channel has been drilled and for the most part, dredged, but has not as

yet been cleaned up and swept. By the middle of the coming season, this will probably be accomplished. Below Twenty-fifth street, Moline, the material to be excavated above grade is mostly mud, and the use of one of the new suction dredges for a few weeks will obtain a good channel of full width and depth.

At the beginning of the season, the extreme upper end of the channel was choked for more than half its width, by a ledge of rock which is known in this report as patch No. 7. Work was commenced here by the drill boat in April, and the patch has been removed. Although circumstances prevented the area being swept, the soundings show that we have a clear channel to full depth, about 300 feet wide at this point. For a distance of about 1,600 feet below the upper mouth, the channel is excavated to full width, but with some cleaning up yet to be done.

The quantity of broken rock removed by dredge in 1909 was 31,819.8 cubic yards, solid measurement, which was chiefly used on the wing dam, on the arsenal waste wall and in protecting the banks of the Illinois and Mississippi Canal. The quantity of rock broken up by drill boat *No. 103* was 7,433.4 solid cubic yards. The cost of blasting in 1909, including all charges, was $2.74 per solid cubic yard, and of dredging and wasting $0.79, making the total cost $3.53 per yard.

Work on the core wall of the long dike, the object and method of which is described in the last annual report (Chief of Engineers, 1909, pp. 1624–1625), was commenced April 8 and continued until November 27. Dredge *Apache*, operating intermittently at the work of dredging mud and loose rock from the inner toe of the dike, removed about 7,337 cubic yards during the season, making a total of 17,277 cubic yards to December 31, 1909, which was deposited on the top and river side of the dike.

Concreting operations were carried on successfully, and 4,123 linear feet of core wall was constructed, making a total continuous length to December 31 of 6,128 feet. About 8,673.5 cubic yards of concrete were deposited during the season, making a total of 13,112.6 cubic yards on this work.

Mr. Bassett says:

> The apron constructed in 1908 had an average width of 19 feet, but owing to the large amount of material already in place in the back fill it was not cut down to much of a slope toward the main river. After a period of high water in the river, and the consequent spill over the wall and apron, it was found that the rock at the extreme edge of the apron washed away and at one point the edge of the apron was broken down. To overcome this trouble the apron placed during the past season was sloped toward the main river, so as to bring its lower edge below the water surface in the river at the time of the spill.
>
> At the beginning of the season it was expected that a full mile of wall would be completed, and at the rate of progress made this would have been accomplished had not the plant been rented to private parties. There still remains about 1 mile of wall to construct at the uper end.
>
> The portion of the wing dam between Benhams Island and the lower end of the core wall leaks badly in many places, and while for the most part it is above ordinary high-water stages there are points where the water spills over at a comparatively low stage. Heretofore it has not been considered that the dam at these points is liable to fail, due to the fact that the failure of the loose-rock dam above acted as a safety valve. Since the construction of the core wall, making the loose dam above secure, a failure at any of these points would be a serious matter, as the head against a possible crevasse would be maintained for a greater period and consequently do more damage. In view of these facts it is thought advisable to construct a wall covering the entire length of dam above Benhams Island.

The cost to date of the concrete used in the core wall (13,112.6 cubic yards) averages $5.19 per cubic yard, and per linear foot of core wall, $10.79.

A survey of the upper portion of the Rock Island Rapids was made during April, May, and June, 1909, and during the winter a survey of Moline pool was made. The cost of the former survey was $3,192.36.

The Rock Island Rapids buoys (42 in number) were all placed during June, except 3 postponed on account of high water. All of the buoys were taken up November 20 and stored for the winter. The cost of buoyage was $652.74.

In July material was purchased and prepared for a system of gauges and in August they were set. These gauges (5 in number) were set in the river on the Iowa side of the core wall, and make a chain extending from the upper end of the wing dam to Moline Lock. A study is being made from the readings of these gauges to determine what effect, if any, the extension of the core wall upstream, as the work progresses from day to day, has on the slope of the rapids channel. A special report will be made on this subject.

In 1910, to June 30, drill boat *No. 103*, dipper dredges *Apache* and *Vulcan*, and boom dredge *No. 319*, have been variously employed in rock and mud excavation and construction of core wall.

Rock Island to Burlington, 79 miles.—Construction work in this division, which was in local charge of Assistant Engineer J. C. McElherne, was done under contract dated June 23, 1909, with A. J. Whitney. Work commenced July 19 and closed for the season November 9. The prices for material were: Rock, $1.45; brush, $0.55 per cubic yard. Very slow progress was made, owing to mismanagement and insufficiency of plant. The closing dam across Blackhawk Chute was repaired, the artificial bank at Muscatine Harbor was protected for a length of 730 feet, some repairs were made to the shore protections at Port Louisa and Bay Island, and a short closing dam at Port Louisa was repaired.

There were put in place in this work 5,288.8 cubic yards of rock and 3,914.8 cubic yards of brush, at an average cost of $1.17 per cubic yard, all charges included.

Dipper dredge *Phoenix* was employed from September 22 to October 6, 1909, in removing a bar from the channel opposite Davenport. An area of 10,000 square feet was covered by the dredge, and 4,934 cubic yards of sand and gravel was removed.

Detached surveys were made in 1909 in vicinity of Keithsburg Bridge and above Buffalo.

In 1910, to June 30, dipper dredge *Vulcan* and hydraulic dredge *Etna* were employed in May and June, the former in removing 2 wing dams below Prairie Bird Point, the latter in dredging the immense bar above Keithsburg Bridge, which obstructed the channel and interfered with the passage of the draw. The Whitney contract resumed in April was completed in July.

Detached surveys were made at Davenport, Lock 37, below Buffalo, and below Montpelier.

At the Milan boat yard during 1909 repairs were made to many pieces of plant, not only for general improvement, but also for Illinois and Mississippi Canal, and for Kansas City and Vicksburg districts. Among the pieces repaired were towboats *Ruth*, *Mac*, *Emily*, and *Fox*; dredges *Ajax*, *Apache*, *Vulcan*, *Phoenix*, *Boom dredge*, and *Geyser*; drill boats *No. 6* and *No. 103*; and 44 miscellaneous pieces, consisting of barges, quarter boats, office boats, dump scows, pontons, and launches.

In above work $22,421 was expended during the season. In addition to above, 8 barges and 1 house boat were built for the canal, 1 barge for Vicksburg district, and 3 for Kansas City district.

In 1910 repairs and construction work were continued at the boat yard. All lumber used at this yard was creosoted by the open-tank process.

Burlington to Hannibal, 98 miles.—Construction work in this division during 1909, which was in local charge of M. Meigs, United States civil engineer, was performed by A. V. Fetter, under contract dated June 19, 1909. The contract prices for material in place were: Rock, $1.50; brush, $0.60 per cubic yard. Operations began July 13 and ceased with completion of the contract, December 1.

Above Des Moines Rapids work was performed at Lead Island, Dutchman Island, Burlington Island, and Thompsons Island, 3 dams and 3 pieces of shore protection being repaired and 1 wing dam built.

Below the Des Moines Rapids, work was done at Hackley Island, Fox Island, Gregory Point, and Fabius Island, and consisted in raising and repairing 3 dams and 2 pieces of shore protection and building 200 linear feet of shore protection.

There were put in place under this contract 14,971.1 cubic yards of rock and 16,580.5 cubic yards of brush, at an average cost of $1,078 per cubic yard. A small amount of dredging was done by dredge *Etna* in vicinity of Nauvoo in deepening the ferryboat crossing.

In 1910, to June 30, some dredging was done by hydraulic dredge *Hecla* at Keokuk and near Montrose.

At the dry dock boat yard repairs were made to snag boat *David Tipton*, to towboats *Henry Bosse*, *Lucia*, and *Grace*, to dredge *Hecla*, to launches *Madge* and *Myra*, and to 3 quarter boats, 3 office boats, 8 barges, and several other miscellaneous pieces. Repairs cost $14,582.76 during season of 1909.

In construction work for the calendar year and to June 30, 1910, 15 barges, 1 large dredge with 12 pontons, 2 quarter boats, 1 fuel flat, and 15 motor skiffs were either wholly built or completed. Of these latter, 8 barges and 1 large quarter boat were built for the Vicksburg district. That part of the construction work done in 1909 cost $42,222, which, added to the cost of repairs, $14,583, gives a total of $56,806 as the business of the yard.

Hannibal to mouth of Missouri River, 118 miles.—Work was performed by hired labor and use of government plant from August 12 to November 12, 1909, in the vicinity of Atlas Island (miles 558–559), where the old shore protection was carried to top of bank and 390 linear feet of new protection built; and in vicinity of Hickory Chute (miles 560–564), where 8,090 linear feet of shore protection was built on Cottonwood Island, South Fritz Island, and on Missouri shore near foot of the chute. Repairs were made to 2 wing dams.

There were put in place 18,224.4 cubic yards of rock and 12,645.6 cubic yards of brush, at an average cost of $1.32 per cubic yard. The large average cost of this work was due to the large percentage of rock, the more expensive material, used.

From August 28 to September 4 dredge *Hecla* was employed at Thomas Landing, where she made a cut 595 feet long and removed 16,644 cubic yards of sand, at a cost of 2.4 cents per yard.

Assistant Engineer A. L. Richards, in local charge of this division, says:

> Owing to the absence of a building boat operations were confined to shore protections, and the stage was very favorable for this work during the balance

of the season. The contractors were fairly prompt in furnishing their proposed amounts of material per day, but a larger yardage could have been used to good advantage. Common labor was very scarce, and it was necessary during the latter part of the season to increase the rate paid per day in order to secure the necessary men. During the season work was done on two dams and six pieces of shore protection.

The localities needing attention next season are as follows: Vicinity of Mundys Landing, dams to be built and old ones repaired; vicinity of Clarksville, shore protection in Clarksville chute; vicinity of Churchs Landing, new shore protection below this landing.

The low stage of water in the fall permitted of a good examination of all constructed works, and in general it was noticed that most of the dams, while in fair condition, were low, and the shore protections were in good condition. It is considered that the dams in this division should be constructed at least 10 per cent heavier, more on the nature of roadway dams, and while this would reduce the number constructed each year, those constructed would be more permanent.

In 1910, during latter part of June, a small survey party was put in the field.

There has been expended to December 31, 1909:

Floating plant	$1,565,042.40
Quarry plant	38,139.37
Boat-yard plant	62,964.77
Total for plant	1,666,146.54

The estimated value January 1, 1910:

Floating plant	$428,223.70
Quarry plant	9,291.74
Boat-yard plant	51,045.90
Total estimated value	488,561.34

Summary showing localities, amounts, and cost of regular construction works in 1909 between St. Paul and mouth of Missouri River.

Method and locality.	Material.			Cost of work.	Average cost per cubic yard.						
	Rock.	Brush.	Total.		On barges.	Towing.	Putting in place.	General superintendence, office expenses, and inspection.	Local superintendence.	Plant.	In place.
HIRED LABOR.											
	Cu. yds.	*Cu. yds.*	*Cu. yds.*								
St. Paul to Winona	15,304.8	35,292.5	50,597.3	$41,186.27	$0.353	$0.143	$0.158	$0.029	$0.071	$0.060	$0.814
Winona to Wisconsin River	16,584.8	43,850.0	62,120.4	51,340.52	.367	.119	.198	.031	.043	.092	.850
Wisconsin River to Le Claire	18,445.3	21,159.2	39,604.5	40,849.71	.395	.191	.229	.039	.049	.129	1.032
Hannibal to Missouri River	18,224.4	12,645.6	30,870.0	40,817.75	.545	.199	.341	.048	.093	.097	1.322
CONTRACT.											
Wisconsin River to Savanna (1908)[a]	14,264.7	20,426.8	34,691.5	32,725.81	......	......	......	.085	......	......	.943
Rock Island to Burlington (1909)[b]	5,288.8	3,914.8	9,203.6	11,725.07	......	......	......	.100	......	......	1.167
Burlington to Hannibal (1909)	14,971.1	16,580.5	31,551.6	34,016.56	......	......	......	.040	......	......	1.080
	103,083.9	153,869.4	258,638.9	252,661.69	......	......	......	......	......	......	.977

[a] Entire contract.

[b] Not completed; includes harbor at Muscatine.

Average cost per cubic yard, day-labor work	$0.951
Average cost per cubic yard, contract work	1.040

SPECIAL WORK.

Bar at Quincy.—The available balance of funds June 30, 1909, was expended in dredging at lower end of bar. No further allotment is asked for.

ALLOTMENTS.

By river and harbor act of June 30, 1896	$10,000.00
By sundry civil act of March 3, 1899	10,000.00
By river and harbor act of June 13, 1902	20,000.00
Total	40,000.00

Harbor of refuge below Davenport, Iowa.—During 1909 some repairs were made to the cribs at mouth of harbor.

ALLOTMENTS.

By sundry civil act of March 3, 1899	$10,000.00
By river and harbor act of June 13, 1902	5,000.00
Total	15,000.00
Balance unexpended	786.98

Harbor at Muscatine, Iowa.—The balance available for this harbor, $1,851.40, was expended in revetting the artificial bank made by a dredge in the previous year. The length of this revetment is 730 feet, and there were used in its construction 925.5 cubic yards of rock and 925.7 cubic yards of brush, at an average cost per yard, including all charges, of $1.17. The work was done under contract with A. J. Whitney.

APPROPRIATIONS AND ALLOTMENTS.

By river and harbor act of—	
March 3, 1879	$7,500.00
June 14, 1880	7,500.00
March 3, 1881	2,500.00
August 2, 1882	2,500.00
By sundry civil act of June 4, 1897	15,000.00
By river and harbor act of June 13, 1902	10,000.00
Total	45,000.00

Dredging in harbors and at landing places.—Under above head there has been allotted $100,000 to be expended under approved allotments for various localities.

At La Crosse and Prairie du Chien work done prior to June 30, 1909, was stated in last year's report.

At Moline, on account of lack of available dredges, but little work was done, and the balance available for this harbor, $12,577.40, was turned over to the general improvement fund in June.

At Quincy the allotment of $10,000 was expended in dredging the bar with hydraulic dredge *Hecla*, working with single crew from April 9 to August 9, 1909. The area covered by the dredge was 481,100 square feet, the quantity of sand removed (approximately), 172,663 cubic yards, and the average cost, 6 cents per yard. This work is considered successful, although further dredging may be ultimately needed.

At Hamburg hydraulic dredge *Hecla*, with single crew, was employed in the removal of the bar at this landing from August 16 to September 30, except a week at Thomas Landing.

The work at Hamburg was in hard gravel, and considerable trouble was experienced on account of the poor condition of the machinery. The material removed at Hamburg (sand and gravel) amounted to 98,050 cubic yards, and the average cost was 4½ cents per cubic yard.

At Louisiana dredge *Hecla*, with single crew, was employed from October 2 to 14, in raising the ferry dike by pumping sand upon it. An unsuccessful attempt was made to remove deposits at the steamboat landing, the material being such that the dredge could not handle it. The sand moved at Louisiana amounted to 28,763 cubic yards, at an average cost of 8 cents per yard. The ferry dike was put in a very satisfactory condition.

The total amount expended at all the selected harbors to June 30, 1910, is $87,422.60. The remainder of the $100,000 allotted was turned into the general fund.

ALLOTMENTS.

By river and harbor act of March 2, 1907	$50,000.00
By sundry civil act of May 27, 1908	50,000.00
Total	100,000.00
Balance unexpended transferred to general improvement	12,577.40

Improving Mississippi River, mouth Missouri River to Minneapolis—Expenditures for calendar year 1909.

St. Paul to Winona		$43,242.07
Winona to Wisconsin River		47,510.43
Wisconsin River to Le Claire		41,112.59
Wisconsin River to Savanna		7,024.67
Rock Island Rapids		79,467.57
Rock Island to Burlington		11,290.69
Burlington to Hannibal		34,687.77
Hannibal to Missouri River		38,161.44
Dredging at harbors and landing places		21,329.53
Harbor of refuge below Davenport, Iowa		1,144.97
Flint Creek-Iowa River levee		2,883.72
Harbor at Muscatine		1,851.40
Bar at Quincy		640.81
Surveys and gauges		2,294.43
Care, repair, and construction of plant and boat yards		192,288.41
		524,930.50
Missouri River plant, to be refunded	$11,183.99	
Mississippi River Commission plant, to be refunded	11,993.78	
		23,177.77
Total expended		548,108.27

Retained percentage December 31, 1909, deducted.
Retained percentage December 31, 1908, added.

CONTRACT IN FORCE JUNE 30, 1910.

A. J. Whitney, construction of dams and shore protections between Rock Island, Ill., and Burlington, Iowa: Rock in place, 16,500 cubic yards, at $1.45; brush in place, 16,500 cubic yards, at $0.55.

Contract approved July 2, 1909; work began July 20, 1909; date of expiration of contract, July 6, 1910.

Contract was completed July 5, 1910.

Net expenditures on various sections of the river, harbors, levees, etc., between Minneapolis and the Missouri River, from commencement of improvement to June 30, 1910.

[4½-foot project.]

Locality.	Distance.	Amount.	Per mile.
	Miles.		
St. Paul to Minneapolis	....	$59,113.46	....
St. Paul to Prescott	30	671,798.35	$22,393
Prescott to Lake Pepin	26	338,219.92	13,008
Foot of Lake Pepin to Alma	11	544,247.77	49,477
Alma to Winona (Chicago and Northwestern bridge)	28	790,102.75	28,218
Winona to La Crosse (Chicago, Milwaukee and St. Paul bridge)	28	890,860.46	31,816
La Crosse to McGregor bridge	64	667,672.80	10,437
McGregor to Dubuque (Illinois Central bridge)	57	543,278.43	9,531
Dubuque to Clinton (Chicago and Northwestern bridge)	62	467,268.48	7,536
Clinton to Le Claire	21	39,830.24	1,897
Rock Island Rapids	14	694,856.86	49,633
Rock Island (U. S.) bridge to Keithsburg bridge	55	402,179.06	7,312
Keithsburg to Nashville	59	934,356.20	16,176
Keokuk bridge to Quincy bridge	37	643,024.12	17,379
Quincy to Clarksville	56	1,086,951.96	19,410
Clarksville to Cap au Gris	37	930,199.56	25,141
Cap au Gris to Illinois River	24	441,582.26	18,399
Illinois River to Missouri River	23	487,485.96	21,195
Harbor of refuge at Pepin	....	25,500.00	....
Ice harbor at Dubuque	....	15,770.65	....
Channel and harbor at Clinton	....	25,000.00	....
Harbor of refuge at Davenport	....	14,213.02	....
Harbor at Muscatine	....	25,000.00	....
Bar at Quincy	....	26,819.02	....
Channel and harbor at Hannibal	....	14,769.67	....
Flint Creek to Iowa River levee	....	300,000.00	....
Warsaw to Quincy levee	....	105,500.00	....
Various harbors, bays, channels, and levees [a]	....	501,688.50	....
Surveys, gauges, and meter work	....	261,162.16	....
Plant, at estimated value	....	159,733.76	....
Total expended	....	12,108,178.42	....
Available for various harbors	....	786.98	....
Total appropriated	....	12,108,965.40	....

[a] The amounts expended at each harbor, bay, etc., under this appropriation, as also additional amounts under special appropriations, are given in Report of Chief of Engineers for 1906, page 1617.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $1,500,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Under former projects from June 18, 1878, to June 30, 1906, inclusive, and under the following heads: St. Paul to Des Moines Rapids, Minneapolis to Des Moines Rapids, Des Moines Rapids to Illinois River, Ohio River to Minneapolis, Ohio River to St. Paul, and Missouri River to St. Paul, aggregating	$12,157,500.02
Less amount transferred to work at Lock and Dam No. 2, Mississippi River, between Minneapolis and St. Paul (act Aug. 18, 1894)	49,877.67
	12,107,622.35
Received from sale of property	1,580.38
	12,109,202.73
Less refundment account channel and harbor at Hannibal	237.33
	12,108,965.40

Of this amount there is a balance remaining of $786.98 belonging to Davenport harbor.

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[a] Exclusive of the balance unexpended July 1, 1910.

FOR CURRENT 6-FOOT CHANNEL PROJECT.

Missouri River to Minneapolis:	
By act approved March 2, 1907	$500,000.00
By act approved May 27, 1908	500,000.00
By act approved March 4, 1909	500,000.00
By acts (2) approved June 25, 1910	1,000,000.00
	2,500,000.00
June 30, 1910, refundments and receipts from sale of maps, etc	32,390.59
	2,532,390.59

Estimate for a 6-foot channel at low water, Mississippi River, St. Paul to Missouri River, under current project, showing amounts expended to June 30, 1910, under each item.

Division.	Estimate.		Expended to June 30, 1910.	
St. Paul to foot of Lake Pepin:				
Dams and shore protections	$702,675	$1,058,025	....	$2,487.81
Repairs to existing work	163,350		....	
Dredging	192,000		$2,487.81	
Lake Pepin to Winona:				
Dams and shore protections	870,750	1,303,035	99,026.84	129,163.83
Repairs to existing work	144,285		19,102.55	
Dredging	268,000		11,034.44	
Winona to Wisconsin River:				
Dams and shore protections	2,316,225	2,632,725	109,076.50	141,489.61
Repairs to existing work	76,500		30,913.11	
Dredging	240,000		1,500.00	
Wisconsin River to Savanna:				
Dams and shore protections	2,108,250	2,316,750	115,149.14	147,367.69
Repairs to existing work	40,000		24,649.53	
Dredging	168,000		7,569.02	
Savanna to Rock Island Rapids:				
Dams and shore protections	1,460,349	1,576,599	....	....
Repairs to existing work	20,250			
Dredging	96,000			
Rock Island Rapids:				
Canal and rock excavation	....	3,099,080	251,435.00	251,435.00
Rock Island to Burlington:				
Dams and shore protections	1,932,918	2,200,918	44,047.98	73,036.52
Repairs to existing work	72,000		18,493.73	
Dredging	96,000		10,494.81	
Rock excavation	100,000		....	
Burlington to Montrose:				
Dams and shore protections	512,163	623,163	7,776.69	15,526.25
Repairs to existing work	63,000		6,841.62	
Dredging	48,000		907.94	
Des Moines Rapids:				
Dam above guard lock	9,000	355,800	....	....
Rock excavation	346,800			
Keokuk to Hannibal:				
Dams and shore protections	1,012,764	1,246,514	51,992.07	70,180.46
Repairs to existing work	87,750		16,048.09	
Dredging	48,000		2,140.00	
Rock excavation	98,000		....	
Hannibal to Missouri River:				
Dams and shore protections	2,122,945	2,717,391	99,394.18	117,296.39
Repairs to existing work	270,446		1,138.56	
Dredging	324,000		1,753.65	
Maintenance during construction	....	870,000	208.90	208.90
Total of project	....	20,000,000	....	....
Expended for floating plant and boat yards, not yet distributed	....	....	....	402,339.05
Total expended on project	....	....	....	1,350,521.51

NOTE.—The total amount expended since the 6-foot channel project was adopted is $1,483,248.65, from which is to be deducted as not pertaining to the project: Dredging in harbors and at landing places, $87,422.60; Isthmian Canal and plant for other districts, $45,304.54 (to be refunded); total, $132,727.14, leaving a balance of $1,350,521.51 expended on the project.

Y 3.

OPERATING AND CARE OF DES MOINES RAPIDS CANAL AND DRY DOCK.

The Des Moines Rapids Canal was in use from July 1, 1909, to November 22, and from April 1, 1910, to June 30, a period of two hundred and thirty-six days. The dry dock was in constant use during the entire fiscal year. United States Civil Engineer M. Meigs, who is in local charge of the canal, says:

The past fiscal year has been distinguished by the complete failure of the June rise in 1910. On the 30th of June, 1910, the stage was only 2 feet above low water instead of the usual flood stage.

At the lower lock one culvert cylinder on the lower east side was found to be ruined by the leakage of sand into the cylinder from a leaky pipe. This cylinder was removed and a new one cast and bored in the machine shop and replaced in the tower.

At the guard lock a concrete foundation for the ice house was built, a gravel foundation put in for the ice to rest on, the old rotten sills were removed and the walls refilled with sawdust, putting the building in good condition.

At the middle lock some repairs were made to the lock ice house; a new roof was put on and the floor raised up.

The boom was taken in for the winter in November and put out again in the following April, and is still in good condition.

The dry dock has been full of work during the whole year. During this time private boats used the dock for quick repairs, with a total of dockage fees of $116.25.

A great amount of work was done repairing the existing plant for the upper Mississippi River improvement and building new plant. Among the latter were eight barges, 120 by 30 by 6 feet, and a two-story quarter boat, 130 by 30 by 5 feet, to be used in the Vicksburg district. The last of the barges were delivered on June 18; the quarter boat will not be finished until the middle of July.

The dredge *Hecla* was completely rebuilt, with new gunwales and rakes, a new deck, and her engine rebuilt and improved. All her piping was taken down and rearranged on a much better plan, and the boat now is doing very satisfactory work.

Only one flood in the canal has occurred, that of May 1, so the amount of sediment brought in has been less than usual. At Prices Creek a bar was thrown out about half way across the canal, and this was removed in the same month by the *Hecla*.

During the months of July, August, September, October, and November, 1909, the suction dredge *Etna*, and during the months of April, May, and June, 1910, the suction dredge *Hecla*, were employed removing the mud deposited in the canal, mostly about the mouths of the three large creeks. Considerable deposit was removed also below the lower lock, which had filled to 3 to 5 feet above grade.

The *Hecla* and *Etna* removed from the canal during the year 231,645 cubic yards of sand, mud, and stone. At the end of the fiscal year the canal is no further ahead in the removal of deposit than at the end of last year. The dredging has barely kept up with the deposit added during the year. The aggregate of dredged material since the canal was opened in 1877 is 2,918,678 cubic yards. The machine shop was kept busy during the entire year.

APPROPRIATIONS AND ALLOTMENTS.

By various acts to June 30, 1902 (H. Doc. No. 421, 57th Cong., 2d sess.)	[a] $934, 909. 07
By act approved July 5, 1884, expended during fiscal year ending—	
June 30, 1903	40, 623. 37
June 30, 1904	45, 161. 69
June 30, 1905	43, 668. 83
June 30, 1906	49, 948. 65
June 30, 1907	37, 698. 97
June 30, 1908	42, 007. 60
June 30, 1909	43, 185. 70
By act approved March 3, 1909: June 30, 1910	38, 772. 18
Total expended	1, 275, 976. 06

Expenditures for operating and care of Des Moines Rapids Canal for fiscal year ending June 30, 1910.

Month.	Office and administration.			
	Salaries.	Supplies.	Miscellaneous.	Total.
1909.				
July [b]				
August	$510. 57	$3. 25		$513. 82
September	639. 55	3. 90	$7. 08	650. 53
October	516. 81	1. 00	19. 70	537. 51
November	1, 060. 43	53. 43	9. 38	1, 123. 24
December	634. 70	12. 75	7. 09	654. 54
1910.				
January	553. 10	19. 76	19. 12	591. 98
February	832. 31	2. 50		834. 81
March	641. 11	2. 00	12. 75	655. 86
April		. 75		. 75
May	500. 00	16. 25	1. 30	517. 55
June				
Total	5, 888. 58	115. 59	76. 42	6, 080. 59

Month.	Canals and locks.			
	Labor.	Supplies.	Current repairs.	Total.
1909.				
July [b]				
August	$1, 454. 25	$111. 39	$101. 67	$1, 667. 31
September	1, 385. 04	468. 06	568. 74	2, 421. 84
October	1, 290. 18	162. 83	387. 66	1, 840. 67
November	2, 648. 09	387. 77	405. 09	3, 440. 95
December	1, 154. 03	17. 50	467. 40	1, 638. 93
1910.				
January	828. 33	9. 90	63. 05	901. 28
February	1, 056. 00	56. 00	231. 94	1, 343. 94
March	877. 50	61. 98	11. 12	950. 60
April	238. 67	286. 76	161. 13	686. 56
May	1, 566. 88	20. 54	79. 89	1, 667. 31
June	2, 858. 32	161. 25	385. 47	3, 405. 04
Total	15, 357. 29	1, 743. 98	2, 863. 16	19, 964. 43

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[a] The amount is $110,000 too small, the appropriations of 1878, 1879, and 1880 having been disregarded in House Document No. 421.

[b] No expenditures; no funds on hand.

Expenditures for operating and care of Des Moines Rapids Canal, etc.—Cont'd.

Month.	Dredging canal.				
	Labor.	Supplies.	Current repairs.	Total.	Grand total.
1909.					
July[a]	....	....	....	....	....
August	$999.05	$681.29	$148.82	$1,829.16	$4,010.29
September	861.38	856.36	88.22	1,805.96	4,878.33
October	1,025.73	752.88	48.20	1,826.81	4,204.99
November	1,369.57	731.57	161.51	2,262.65	6,826.84
December	155.25	66.34	31.36	252.95	2,546.42
1910.					
January	150.00	....	....	150.00	1,643.26
February	150.00	44.00	491.64	685.64	2,864.39
March	150.00	61.15	224.81	435.96	2,042.42
April	....	256.29	1,021.52	1,277.81	1,965.12
May	106.07	44.47	616.90	767.44	2,952.30
June	740.92	520.97	170.89	1,432.78	4,837.82
Total	5,707.97	4,015.32	3,003.87	12,727.16	38,772.18

[a] No expenditures; no funds on hand.

Traffic statement of Des Moines Rapids Canal for the fiscal year ending June 30, 1910.

Month.	Steamboats.		Barges.		Passengers.	Merchandise.	Grain.	Lumber.	Logs.	Lockages at lower lock.
	Commercial.	Government.	Commercial.	Government.						
1909.						*Tons.*	*Bush.*	*Feet.*	*Feet.*	*No.*
July	107	19	39	6	8,047	3,694	....	....	....	177
August	144	16	53	23	12,446	2,517	2,000	4,250,000	....	260
September	131	17	39	27	2,921	2,033	....	1,500,000	....	190
October	102	25	18	24	916	561	....	1,833,330	....	150
November	45	24	9	29	113	213	....	....	1,333,328	89
December	1	1	....	....	....	....	....	....	....	1
1910.										
March	7	4	8	3	53	80	....	....	....	26
April	46	21	17	28	284	837	....	....	....	97
May	92	19	31	24	853	1,936	....	....	1,510,000	186
June	151	13	35	9	6,251	2,385	16,500	....	1,500,000	211
Total	826	159	249	173	31,884	14,256	18,500	7,583,330	4,343,328	1,387

Y 4.

IMPROVEMENT OF MISSISSIPPI RIVER AT MOLINE, ILLINOIS.

During the season of 1909 all work was performed by hired labor and use of government plant. In March a small force was employed in completing the levee raised in 1908 on south bank of the upper approach to Moline lock and extending from site of Sears dam to the lock. The entire length, 2,035 feet, was surfaced and the north side revetted. The cost of this work, which was finished in May, was $1,199.74. U. S. hydraulic dredge *Vesuvius*, with double crew from June 24, was employed from June 12 to August 20 in dredging mud from the pool channel opposite head of Arsenal Island. Three cuts were made and all of the spoil, 54,440 cubic yards, was wasted at the waste wall at head of the island. The dredge was also employed for a short time at two other localities farther up the approach, and the spoil, about 7,550 cubic yards of mud and sand, was deposited inside the core waste wall. The average cost of the abovementioned dredging, including all charges, was about 9 cents per cubic yard.

Dipper dredge *Vulcan* was employed for short periods in dredging mud, mixed with rock, from the site of the old Sears dam (871.1 cubic yards) and in cleaning of broken rock the lower approach to the lock (385.8 cubic yards, solid measurement). The mud dredging cost 15 cents per cubic yard and the broken rock $2.50.

Boom dredge *No. 319* was engaged four days in August, 1909, removing mud from the pool channel at a point which could not be reached by the suction dredge, opposite head of Arsenal Island. The spoil was 2,300 cubic yards of mud, which cost about 3 cents per yard. Surveys of the pool channel and lower approach to lock were made in December and the notes were platted during the winter.

In 1910 dredge *Vesuvius* resumed dredging mud and sand, in May, in upper approach and continued to June 30. The balance unexpended June 30, 1909, $13,174.58, has been expended and no further appropriation is asked for.

APPROPRIATIONS.

By act approved—	
March 3, 1905	**$100,000**
June 30, 1906	**150,000**
March 4, 1907	**136,000**
Total	**386,000**

Y 5.

OPERATING AND CARE OF MISSISSIPPI RIVER IMPROVEMENT AT MOLINE, ILLINOIS.

During the past fiscal year the lock was in operation from July 1 to December 1, 1909, and from March 20 to June 30, 1910, a period of two hundred and fifty-six days.

Assistant Engineer J. B. Bassett, in local charge of operation of Moline lock, reports:

> A combined office and dwelling building was constructed (in part by contract and partly by hired labor) on the south back fill of the lock during the past year. Work on this structure was commenced during the latter part of October, 1909, and was continued during the winter and spring to completion. This building was occupied on March 30, but the outside finishing was not completed until about the middle of June.
>
> The operating force was employed, when not actually passing boats through the lock, at making minor repairs to lock machinery and electrical equipment, grading, draining and seeding new lawns, mowing grass and weeds, painting exposed ironwork, etc. The ice house on Benhams Island was filled during the winter. The steamer *B. B.*, engaged in ferry business between Moline and Bettendorf, operated from July 1 to October 5, 1909, when operations were sus-

pended for the season. Her operations for 1910 were carried on from May 29 to June 30.

No accidents occurred during the year either to the lock or craft using the lock. A few minor difficulties occurred to the electrical equipment, however.

There are no outstanding liabilities.

ALLOTMENTS.

By act approved July 5, 1884, expended during fiscal year ending—	
June 30, 1908	$4,799.03
June 30, 1909	10,000.00
By act of March 3, 1909—	
June 30, 1910	9,966.15
Total	24,765.18

Summary of expenditures for operating and care of Mississippi River improvement at Moline for the fiscal year ending June 30, 1910.

Month.	Superintendence, office expenses, supplies, engineering, and contingencies.	Labor.	Repairs.	Lock office and dwelling.	Total.
1909.					
July[a]					
August	$47.53	$373.50	$198.00		$619.03
September	67.31	453.48	39.60		560.39
October	72.75	357.50			430.25
November	158.70	484.73		$484.22	1,127.65
December	45.31	424.88	59.83	163.78	693.80
1910.					
January	20.78	218.33		724.20	963.31
February	184.43	220.03	166.68	2,537.34	3,108.48
March	15.00			65.42	80.42
April	120.58	292.50		72.35	485.43
May	40.40	333.70		336.35	710.45
June	29.33	1,028.97	28.20	100.44	1,186.94
Total	802.12	4,187.62	492.31	4,484.10	9,966.15

[a] No expenditures; no funds on hand.

COMMERCIAL STATISTICS.

Traffic statement for the fiscal year ending June 30, 1910.

Designation.	Commercial.		Government.		Total.
	Up.	Down.	Up.	Down.	
Steamers.........number..	2,109	2,125	152	148	4,534
Steamers.........tons..	204,736	205,725	6,740	6,680	423,881
Barges.........number..	39	18	180	173	410
Barges.........tons..	2,351	1,177	14,556	14,691	32,775
Launches.........number..	273	158	13	11	455
Launches.........tons..	771	475	92	89	1,427
Passengers.........number..	30,679	29,716			60.395
Merchandise.........tons..	334½	436	1,078	12,890	14,738½
Lockages.........number..	2,187	2,168	111	108	4,574

Y 6.

OPERATING AND CARE OF MILAN SECTION OF ILLINOIS AND MISSISSIPPI CANAL.

During the past fiscal year the canal was open to navigation from July 1 to December 9, 1909, and from March 21 to June 30, 1910, a period of two hundred and sixty-four days.

The regular canal force cared for plant; cleared the embankments of tall weeds, grass, etc.; sediment and flood débris from locks, sluiceways, dam, and ditches; made light repairs to bridges, cribs, signal apparatus, telephone lines, and fences; attended to ice harvesting, and with additional help repaired telephone lines and instruments; repapered some rooms of lock houses; reinforced old lock gates; rebuilt a wrecked crib in upper level of canal; assisted labor force at times; cut and burned brush from South Slough and procured a supply of coal for winter use at the office and locks.

Dredging.—The suction dredge *Geyser* with double crew, on July 1, 1909, dredged out a shoal spot 150 feet long from canal just below Lock 35; July 2 to 21 cut through big bar below Lock 37, down river, to a width of 150 feet a distance of 420 feet; and from July 22 to August 20 excavated in channel between Lock 29 and head of Andersons Island over an area width 75 feet, length 1,233 feet. April 4 and 5, 1910, cleaned sediment from upper approach to Lock 35, and June 1 to 22 dredged out a section of channel below Lock 29, 75 feet wide by 1,775 feet in length to a depth of 7 feet in the pool.

Dredge *Phoenix* with single crew cleared gravel, loose rock, etc., June 21 to 30 from a section of Rock River pool channel above Andersons Island 300 feet in length by 60 feet in width to a grade of 7 feet.

Dredge *Ajax* with single crew May 4 and 5, 1910, cleaned out a pit in canal for lower outer edge of boat ways and deepened a short narrow landing for boats at Silver Lake boat yard.

The receipts for ice privileges during the year were $198.

On June 30, 1910, the outstanding liabilities were $763.90.

ALLOTMENTS.

By act approved July 5, 1884, expended during fiscal year ending—

June 30, 1895	$255.00
June 30, 1896	5,309.17
June 30, 1897	4,752.46
June 30, 1898	4,502.39
June 30, 1899	3,304.92
June 30, 1900	5,379.84
June 30, 1901	4,806.18
June 30, 1902	11,014.93
June 30, 1903	11,398.94
June 30, 1904	13,198.47
June 30, 1905	$13,601.96
June 30, 1906	9,694.47
June 30, 1907	8,423.46
June 30, 1908	13,428.19
June 30, 1909	19,700.00
June 30, 1910, act March 3, 1909	18,908.01
Total	147,678.39

Summary of expenditures for operating and care of Milan section, Illinois and Mississippi Canal, for the fiscal year ending June 30, 1910.

Month.	Superintendence, office expenses, engineering, and contingencies.	Operating and care, locks and bridges.	Supplies.	Repairs.	Dredging.	Total.
1909.						
July	$293.35	$1,207.61		$22.96	$741.28	$2,265.20
August	204.50	1,267.48	$47.01	288.46	1,262.27	3,069.72
September	210.77	770.95		66.57	547.71	1,596.00
October	109.17	534.06				643.28
November	271.96	1,044.35	132.34	210.45		1,659.10
December	200.74	768.89	18.90	181.76		1,170.29
1910.						
January	292.79	418.59		233.55		944.93
February	382.13	335.00		76.03		793.16
March	304.11	384.47		141.04		829.62
April	254.42	499.94	46.36	114.06	235.00	1,149.78
May	50.00	689.32		927.21	33.38	1,699.91
June	12.00	637.52	68.27	672.91	1,696.37	3,087.07
Total	2,585.94	8,558.18	312.88	2,935.00	4,516.01	18,908.01

COMMERCIAL STATISTICS.

Traffic statement of Lock 36 of Milan section of Illinois and Mississippi Canal for the fiscal year ending June 30, 1910.

Designation.		Commercial.		Government.		Total.
		Up.	Down.	Up.	Down.	
Steamers	number	26	26	106	105	263
Steamers	tons	1,012	1,054	4,538	4,494	11,098
Barges	number	74	76	257	250	657
Barges	tons	2,176	2,400	15,835	15,430	35,841
Launches	number	535	518	191	206	1,450
Launches	tons	1,231	1,246	1,952	1,924	6,353
Passengers	number	1,931	1,955	152	144	4,182
Merchandise	tons	35	161.9	63	20.8	280.7
Lumber	do	1		100	2	103
Rock	do			12,767		12,767
Coal	do		1,073	24	336	1,433
Wood	do		222			222
Ice	do			28.5		28.5
Shells	do		172			172
Sand and gravel	do	100		712	518	1,330
Cement	do				5	5
Lockages	number	462	464	446	429	1,801

Total number of boats, 1,713; total number of barges, 657; total tons of freight, 15,111; total number of passengers, 4,182.

Y 7.

ILLINOIS AND MISSISSIPPI CANAL—IMPROVEMENT OF ROCK RIVER POOL.

The pool is that section of Rock River, about 8.7 miles in length, forming a link between Lock 29 and Lock 35 of the Illinois and Mississippi Canal. Assistant Engineer R. Monroe, in local charge of this work, gives a history of this improvement in his annual report. He says:

> The Milan section of the canal, including Rock River pool, was transferred to the Rock Island district in March, 1901. An examination of the pool was made in June, 1901, showing a navigable depth of 7 feet extending about 5.3 miles from Lock No. 35 to Case Creek and of only about 3 feet at various points through the remaining portion of the pool.
>
> Detail surveys of the pool and bottom lands adjoining were made in 1901 and 1905, respectively, and estimates rendered upon various plans with widths of channel ranging from 80 to 300 feet and upon raising the pool level to avoid excavating rock and other materials in the river.
>
> It was finally determined that a steamboat channel through the pool could be obtained at less cost by excavating in the river bed than by raising the pool level and obtaining flowage rights on adjoining land.
>
> Prior to 1907 the work consisted chiefly in clearing the stream and banks of snags and leaning trees, besides a little bit of dredging in 1903, in the vicinity of Hilliers Islands.
>
> Between July 1 and November 19, 1909, operations were continued principally between Lock No. 29 and the foot of Andersons Island. The floating plant was laid up at the Milan boat yard about November 19, 1909, where it was repaired during the winter. Operations were resumed about April 1, 1910, continuing to the end of the fiscal year, at both Hillers Crossing and vicinity of Lock No. 29.
>
> Between Lock No. 29 and the foot of Andersons Island the drilling and blasting is practically completed, and a channel varying in width from 75 to 200 feet and a depth of 7 feet has been obtained.
>
> At Hillers Crossing the required drilling and blasting is about two-thirds finished and an 80-foot channel to the required 7-foot grade has been obtained. It is expected to complete this crossing, as well as the remaining work below Lock No. 29, early in September. The remaining rock excavation below Hillers Crossing can be removed before the end of the present working season with the plant now employed, but it is thought that the sand excavation can not be completed at that time without the employment of an additional suction dredge.
>
> A survey of the pool was made in September, 1909. Sounding lines crossing the pool were spaced usually 200 feet apart, except at crossings where rock was found above grade, when soundings and borings were taken 20 feet apart.
>
> Coal is mined in many places along the pool, and plans are under way to transport much of it by water. During the fiscal year the traffic in the pool consisted of 57 commercial boats, carrying 3,505 passengers, and 117 barges, with 1,323 tons of merchandise, coal, wood, etc.

Summary of cost of improvement of Rock River Pool to June 30, 1910.

Hillers Crossing	$9,448.35
Below Lock No. 29	28,314.45
Miscellaneous	7,018.77
Total for fiscal year 1910	44,781.57
Previous expenditures	43,899.29
Total to date	88,680.86

Y 8.

OPERATING AND CARE OF GALENA IMPROVEMENT, ILLINOIS.

During the past fiscal year the lock was in operation from July 1 to November 10, 1909, and from March 19 to June 30, 1910, a period of two hundred and thirty-seven days. Mr. S. Edwards, assistant engineer, in local charge says:

> Small repairs were made to dam and lock house. New gates were built to replace old ones, which were rotten and in a dangerous condition. About

106,127 cubic yards of sand and mud were removed by hydraulic dredge *Vesuvius* from Harris Slough and Galena River, principally the latter. Approximately 13,400 linear feet of retaining fence was built on bank of Galena River to hold dredge spoil. Of this 4,200 feet were used during 1909, the 9,200 linear feet built during 1910 being for future dredging.

The usual survey of Galena River and Harris Slough was made June, 1910.

APPROPRIATIONS AND ALLOTMENTS.

By act approved—

September 19, 1890, purchase of improvement	$100,000.00
July 5, 1884, expended during fiscal year ending—	
June 30, 1894	635.68
June 30, 1895	6,000.00
June 30, 1896	3,400.00
June 30, 1897	8,588.20
June 30, 1898	5,890.05
June 30, 1899	3,226.87
June 30, 1900	8,750.94
June 30, 1901	12,077.01
June 30, 1902	9,166.68
June 30, 1903	2,937.27
June 30, 1904	2,916.49
June 30, 1905	3,833.28
June 30, 1906	2,679.91
June 30, 1907	2,805.06
June 30, 1908	4,000.00
June 30, 1909	4,500.00
June 30, 1910, act approved March 3, 1909	13,608.06
Total	195,015.50

Summary of expenditures for operating and care of Galena River improvement for the fiscal year ending June 30, 1910.

Month.	Superintendence, office expenses, engineering, and contingencies.	Operating.		Repairs (including new gates).	Dredging.	Total.
		Labor.	Supplies.			
1909.						
July		$316.60	$25.69	$6.79		$349.08
August	$19.00	265.48	41.75	6.72	$609.86	942.81
September	53.51	278.00	16.05	337.07	2,478.10	3,162.73
October	52.06	206.01	62.45	270.99	1,523.41	2,114.92
November	46.54	173.33	16.40	723.86	45.07	1,005.20
December	75.97	160.00		802.31		1,038.28
1910.						
January	25.52	169.00	59.53	358.10		612.15
February	84.35	200.00	6.05	484.43		774.83
March	81.97	120.00	3.30	482.58		687.85
April		166.17	14.68	453.22		634.07
May		216.50	14.45	36.00	552.02	818.97
June		200.00	14.27	94.84	1,158.06	1,467.17
Total	438.92	2,471.09	274.62	4,056.91	6,366.52	13,608.06

COMMERCIAL STATISTICS.

Traffic statement of the Galena River improvement for the fiscal year ending June 30, 1910.

Month.	Steamers.		Barges.		Launches.		Passengers.	Merchandise.	Lockages.
	Up and down.	Tons.	Up and down.	Tons.	Up and down.	Tons.			
1909.	*Number.*		*Number.*		*Number.*		*Number.*	*Tons.*	*Number.*
July	....	....	34	231	672	904	2,816	219	422
August	8	440	83	1,711	635	1,171	2,359	1,736	358
September	12	240	60	1,868	432	838	1,299	1,469	250
October	10	300	106	2,298	363	777	953	1,836	246
November	....	....	38	799	110	215	199	492	85
1910.									
March	....	....	....	....	40	60	135	....	....
April	6	270	40	600	169	222	532	478	44
May	2	90	73	2,404	560	929	1,882	1,781	365
June	....	....	65	1,811	574	821	2,613	886	369
Total	38	1,340	499	11,722	3,555	5,937	12,788	8,897	2,139

APPENDIX Z.

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. PAUL, MINNESOTA, DISTRICT.

REPORT OF MAJ. FRANCIS R. SHUNK, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Mississippi River between St. Paul and Minneapolis, Minnesota.
2. Operating and care of Lock and Dam No. 2, Mississippi River, between St. Paul and Minneapolis, Minnesota.
3. Reservoirs at headwaters of Mississippi River.
4. Mississippi River between Brainerd and Grand Rapids, Minnesota.
5. Operating and care of reservoirs at headwaters of Mississippi River.
6. St. Croix River, Wisconsin and Minnesota.
7. Minnesota River, Minnesota.
8. Red River of the North, Minnesota and North Dakota.
9. Warroad Harbor and Warroad River, Minnesota.
10. Survey of Otter Tail Lake and Otter Tail River, and Red Lake and Red Lake River, Minnesota, and Big Stone Lake and Lake Traverse, Minnesota and South Dakota.
11. Gauging Mississippi River at or near St. Paul, Minnesota.

United States Engineer Office,
St. Paul, Minn., July 16, 1910.

Sir: I have the honor to submit herewith annual report on river and harbor works in my charge for the fiscal year ending June 30, 1910.

Very respectfully,
Francis R. Shunk,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

Z 1.

IMPROVEMENT OF MISSISSIPPI RIVER BETWEEN ST. PAUL AND MINNEAPOLIS, MINNESOTA.

The approved project will be found in the Report of the Chief of Engineers for 1909, Part 1, page 629.

Lock and Dam No. 1.—No work of construction was done during the year, work having been suspended in the spring of 1909 pending action on the proposed modification of the project. The report of the Board of Engineers was submitted January 31, 1910, and the project was modified by Congress in the river and harbor act approved June 25, 1910, in accordance with the recommendation of the Chief of Engineers in House Document No. 741, Sixty-first Congress, second session.

The following is a brief statement of the work done: A pumping plant was installed at the cofferdam for the abutment at the east end of the dam and a pump house built; new crusher purchased and installed; the abutment cofferdam was protected from scour and low places filled up; the cableway and engines were overhauled; all other machinery and plant were overhauled and put in condition for resumption of work; and plans and models of different types of dams, gates, etc., were prepared in anticipation of a revision of the project.

Statement of expenditures during the year.

Cofferdam:		
Labor	$1,729.91	
Material	178.87	
		$1,908.78
Plant:		
Care	799.22	
Maintenance	88.70	
New	2,468.77	
Repairs	1,839.00	
		5,195.69
Engineering and superintendence		1,673.54
Excavation, labor		319.86
Board of engineers		367.25
Care of property		3,056.34
Office, division engineer		300.00
Office		2,698.52
Total		15,519.98

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $250,000.00

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

August 18, 1894	$51,000.00	March 3, 1903	$223,579.33
July 13, 1892 (allotted by act of Aug. 18, 1894)	49,877.67	June 30, 1906	30,000.00
June 3, 1896	100,000.00	March 4, 1907	30,000.00
March 3, 1899	150,000.00	March 4, 1909	180,000.00
June 6, 1900	185,000.00	June 25, 1910	59,543.00
March 3, 1901	157,000.00		1,466,000.00
June 28, 1902	250,000.00		

---

[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

The principal commerce over this part of the river was the drifting of about 88,000,000 feet b. m. of loose logs (about 440,000 tons) over the upper and middle sections and rafting the same with steamboats on the lower section. The estimated value of these logs was $1,936,000.

The excursion business on the lower and middle sections amounted to about $15,000. The river is also much used by steam and naphtha pleasure boats.

Z 2.

OPERATING AND CARE OF LOCK NO. 2, MISSISSIPPI RIVER BETWEEN ST. PAUL AND MINNEAPOLIS, MINNESOTA.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 631.

The expenditures during the year were $1,697.82.

The lock was open for navigation until November 6, 1909, when the upper needle dam was put in, the upper gate lowered, and the lower gates opened. On April 18, 1910, the lock was again put in commission.

There was one lockage during the year.

Minor repairs were made to the gates and operating machinery, to the keeper's dwelling, and elsewhere as was necessary.

The following is a brief statement of the liabilities incurred during the year:

Operation and minor repairs	$1,381.85
Administration, superintendence, etc	338.13
Total	1,719.98

Total liabilities incurred in each fiscal year:

During the fiscal year ending—	
June 30, 1908	$5,736.02
June 30, 1909	1,804.83
June 30, 1910	1,719.98
Amount available June 30, 1910	1,499.17
Total	10,760.00

ALLOTMENTS.

June 21, 1907	$6,680
June 24, 1908	2,400
July 2, 1909	1,680
Total	10,760

COMMERCIAL STATISTICS.

For commercial statistics reference should be made to the report on the improvement of the Mississippi River between St. Paul and Minneapolis, Minn.

Z 3.

CONSTRUCTION OF RESERVOIRS AT HEADWATERS OF MISSISSIPPI RIVER.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 632.

OPERATIONS DURING THE YEAR.

A dike was constructed on Sandy Lake reservoir in the NE. ¼ NE. ¼ of sec. 25, T. 50 N., R. 24 W., half a mile from the reservoir dam. Its construction was necessary to prevent the overflow of the reservoir, when full, into a tamarack swamp. Under normal conditions the swamp drained into the reservoir. To provide drainage in place of that shut off, the material for the dike was so taken as to make a ditch through a narrow low sand ridge, which ditch now carries the swamp water into a water course emptying into the Mississippi River. The dike is 480 feet long, 15 feet wide on top, with 1 on 3 side slope. It contained 636 cubic yards of material.

Reconstruction of Sandy Lake dam.—The plans for the lock were approved by the Chief of Engineers late in June, 1909. The work of reconstruction was resumed on July 2, when the closing cofferdam at lower end of lock inclosure was begun. This cofferdam was 122 feet long, 10 feet wide inside, and was filled with 757 cubic yards of material. Two 10-inch centrifugal pumps were set up, one at each end of the inclosure, and the inclosure pumped out on July 23. The two old bear-trap lock gates were removed. From the old lock walls there were taken 173,420 feet b. m. of timber, 463 cubic yards of rock, and 263 cubic yards of mud and débris. There were excavated 1,813 cubic yards for upper and lower lock-gate recesses, and upper and lower land wall wings; 75 round piles were driven for foundation of lock gate recess walls; 173 linear feet of wooden sheet piling were driven for cut-off wall beneath river wall and lower gate. The land wall was completed October 6, the river wall October 23, and the arch-over fishway, connecting the lock with the dam built the previous year, was completed October 27. The concrete in all totaled 2,407 cubic yards; 3,294 cubic yards of material were placed for back fill to land lock wall and terreplein. The river bank on south side below dam was protected by 284 cubic yards of bowlder riprap. By the 1st of December one carload of steel for the lock gates had arrived, but as it was too cold to work to advantage on the gates, their erection was postponed until spring when other work requiring open weather could be carried on at the same time. The pumps were therefore shut down on December 14 and the cofferdam allowed to fill. The plant was overhauled and put in order for the winter, and the crew was laid off December 18. During the winter the rest of the lock-gate steel was received. On April 18, the season opening up very early, the cofferdam was pumped out and work resumed. The contractors erected the upper and lower steel lock gates between April 22 and May 27. During that time and up to June 30, the regular crew laid and grouted the rails for gates and bridge; placed and grouted guide I beams in gate recesses; fitted gate stop waters and filling and emptying valve stop waters, and painted the steel gates and bridge a first coat of red lead and boiled linseed oil, followed by a coat of black graphite paint. Bridge floor was laid and railings and wheel guards set. The roadbed was raised by the addition of 101 cubic yards of concrete.

Construction of Gull Lake reservoir.—Commissioners were appointed January 12, 1910, in the condemnation proceedings instituted by the Secretary of War at the request of the St. Anthony Falls Water Power Company for the balance of the flowage rights required for the reservoir. The commissioners viewed the land in April and submitted their report in May. The awards were accepted by the St. Anthony Falls Water Power Company, but several appeals have been made by owners. These appeals will be tried during the July term of court at Duluth, Minn. If the results of the appeals are satisfactory to the St. Anthony Falls Water Power Company, plans will be submitted for approval as soon as possible, and it is hoped that it will be possible to commence construction shortly thereafter. If, however, excessive damages are awarded, it is probable that they will be rejected and the project abandoned for the present. In addition to the flowage rights in process of condemnation, flowage rights on 310.45 acres were deeded to the United States during the year, making a total of 593.95 acres, in addition to those in process of condemnation, the acreage of which is 351.40.

Statement of expenditures during the year.

Reconstruction of Sandy Lake dam:		
Bridge on dam	$297.15	
Cleaning up	470.92	
Cofferdams	1,113.99	
Concrete—		
Forms	3,336.04	
Labor	2,974.99	
Material	2,647.73	
Dikes	603.96	
Excavation	841.71	
Embankment	989.74	
Lock gates and bridge	7,453.31	
Removing old lock	1,711.48	
Stop planks	35.35	
Sheet piling	367.03	
Plant	1,188.51	
Pumping	1,726.76	
Repairs to buildings	259.94	
Riprapping	499.48	
Round piling	241.91	
Piers and booms	6.50	
Foundations	55.00	
Superintendence	1,747.22	
		$28,568.72
Construction of Gull Lake reservoir:		
Engineering and superintendence	11.24	
Flowage rights	251.29	
Hydrological observations	84.00	
		346.53
Purchase of lands or easements below Pokegama		14.50
Administration and St. Paul office expenses		4,111.65
Total		33,041.40

It is believed that the available funds are sufficient to complete the existing project.

APPROPRIATIONS.

June 14, 1880	$75,000.00
March 3, 1881	150,000.00
August 2, 1882	300,000.00
July 5, 1884	60,000.00
August 5, 1886	37,500.00
August 11, 1888	12,000.00
September 19, 1890	80,000.00
July 13, 1892	60,000.00
August 18, 1894	51,000.00
June 3, 1896	80,000.00
March 3, 1899	210,000.00
June 13, 1902	250,000.00
March 3, 1905	$160,000.00
March 2, 1907	145,000.00
June 25, 1910	61,200.00
	1,731,700.00
Deduct amount expended for improving Mississippi River between Brainerd and Grand Rapids	19,000.96
Total	1,712,699.04

For commercial statistics reference should be made to the report on "Improvement of Mississippi River between Brainerd and Grand Rapids, Minnesota."

Z 4.

IMPROVEMENT OF THE MISSISSIPPI RIVER BETWEEN BRAINERD AND GRAND RAPIDS, MINNESOTA.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 634.

As the appropriation only became available June 25, 1910, no work was done during the year.

The available funds are probably sufficient to complete the project.

APPROPRIATIONS.

Amount expended under appropriation for construction of reservoirs at headwaters of the Mississippi River	$19,000.96
June 25, 1910	22,555.00
Total	41,555.96

COMMERCIAL STATISTICS.

The river business for the season of 1909 was carried by the steamer *Oriole*, about 30 tons, the steam barge *Atlas*, about 100 tons, both of Aitkin, Minn., and several smaller boats ranging from 5 to 15 tons, owned in Aitkin and other places. About 2,700 tons of miscellaneous freight was carried, valued at $150,000, and about 2,200 passengers. In addition, there were floated down the river about 250,000,000 feet b. m. of loose logs and rafts of lumber, cedar poles, and ties, the whole being valued at $4,500,000. The weight of these was about 1,125,000 tons.

Z 5.

OPERATING AND CARE OF RESERVOIRS AT HEADWATERS OF MISSISSIPPI RIVER.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 635.

Winnibigoshish, Leech Lake, Pokegama, and Pine River reservoirs were in operation during the entire year. Sandy Lake was out of commission on account of the reconstruction of the dam. The following additional work was done during the year: Repairs and alterations were made to the dams, buildings, dikes, booms, roads, and telephone line as required.

Leech Lake reservoir.—The revetment of the earthen portion of the dam was completed and the top regraded. The following materials were placed: 1,135 cubic yards of bowlders, covering 3,075 square yards of the upstream slope; 840 square yards of marsh sod under the lower portion of the riprap; and 1,380 cubic yards of earth on top of the embankment.

Plans were approved for alterations and additions to the quarters at Pine River and Sandy Lake dams. The work is well under way at these places and necessary repairs will be begun as soon as possible at the other dams.

The following is a brief statement of the liabilities incurred during the year:

Operation and minor repairs to dams and quarters	$12, 557. 29
Portable concrete plant	3, 368. 35
Repairs to embankment, Leech Lake dam	7, 813. 67
Repairs to roads and telephone lines	1, 466. 63
New buildings	4, 053. 30
Hydrological expenses	379. 23
Administration, traveling expenses, etc	6, 097. 54
Total	35, 736. 01

The following table shows the discharge and difference in storage for the year:

Reservoir.	Gauge in lake.			Average discharge per second.	Total storage June 30, 1910.	Increase (+) or decrease (−) in storage since June 30, 1909.
	Standard high-water flowage line.	June 30, 1909.	June 30, 1910.			
	Feet.	*Feet.*	*Feet.*	*Cubic feet.*	*Cubic feet.*	*Cubic feet.*
Winnibigoshish [a]	14.20	11.28	11.41	598	31,624,580,000	+ 583,440,000
Leech Lake [a]	5.74	3.81	4.09	514	22,707,443,000	+1,684,119,000
Pokegama	12.00	10.41	9.35	1,309	2,905,500,000	− 839,400,000
Pine River	18.50	10.90	3.22	399	52,084,000	−3,014,886,000
Sandy Lake	11.00	3.04	2.80	140	264,780,000	− 59,712,000
Total					57,554,387,000	−1,646,439,000

[a] The water from these two reservoirs passes through Pokegama reservoir. Total average discharge from Pokegama, Pine River, and Sandy Lake, 1,848 cubic feet per second.

Total liabilities incurred in each fiscal year.

During fiscal year ending June 30—	
1895	$6, 416. 19
1896	30, 800. 15
1897	35, 180. 41
1898	19, 487. 80
1899	14, 100. 02
1900	19, 350. 00
1901	18, 498. 12
1902	14, 500. 00
1903	12, 302. 18
1904	11, 280. 00

During fiscal year ending June 30—	
1905	$12, 940. 00
1906	24, 789. 03
1907	16, 084. 97
1908	18, 369. 87
1909	28, 217. 29
1910	35, 736. 01
Amount available June 30, 1910	3, 870. 93
Total	321, 922. 97

ALLOTMENTS.

January 25, 1895	$17,590.00	July 23, 1903	$12,182.18
June 15, 1895	18,852.91	July 12, 1904	5,540.00
June 20, 1896	5,000.00	July 13, 1905	13,400.00
July 24, 1896	23,471.98	October 19, 1905	7,000.00
For repairs to Pine River reservoir	7,481.86	May 29, 1906	2,500.00
August 4, 1897	23,870.00	June 28, 1906	15,914.00
August 4, 1898	16,347.80	June 21, 1907	19,034.00
August 15, 1899	12,720.02	June 24, 1908	17,020.00
July 16, 1900	20,610.00	September 9, 1908	17,000.00
September 28, 1900	7,000.00	June 29, 1909	33,140.00
August 12, 1901	12,948.12	Total	321,922.97
July 16, 1902	13,300.00		

COMMERCIAL STATISTICS.

For commercial statistics reference should be made to the reports on the improvement of the Mississippi River between Brainerd and Grand Rapids, Minn., and between Minneapolis and St. Paul, Minn.

Z 6.

IMPROVEMENT OF ST. CROIX RIVER, WISCONSIN AND MINNESOTA.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 636.

The renewal and repair of the brush and stone dam at Folsoms Island, near Taylors Falls, Minnesota, which was in progress at the end of the last fiscal year was completed, 60 cords of brush fascines and 204 cubic yards of stone being used. Early in August the dredge fleet was taken to Osceola, Wis., and the dikes and riprapping at Allens Slough and Sweazys bar were repaired, 116 cords of brush fascines and 237 cubic yards of stone being placed. On September 25 the fleet was moved to Hudson, Wis., where a bar which had formed in the channel was dredged through, a total of 1,320 cubic yards of material being removed. Buoys were placed to mark Catfish bar, near Hudson. About the middle of October the fleet moved to the Minnesota River, near Mendota, Minn., where it was used in the improvement of that river. Owing to the shortage of available funds no other work was done during the year.

It is my opinion that the St. Croix River, Wisconsin and Minnesota, is worthy of further improvement to the extent of regaining and maintaining the results obtained under the project.

Statement of expenditures during the year.

Fuel and oils	$129.91
Brush and stone dams	1,452.91
Dredging	191.75
Subsistence	833.36
Gaugings	55.00
Inspection	15.86
Care of boats and property	55.40
St. Paul office	76.98
Total	2,811.17

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $3,600

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to December 31, 1902 (as per statement in H. Doc. No. 421, 57th Cong., 2d sess.)	$138,500
April 28, 1904 (allotment)	865
March 3, 1905	4,000
March 2, 1907	4,000
March 3, 1909	3,600
June 25, 1910	4,000
Total	154,965

COMMERCIAL STATISTICS.

Rafted lumber, etc., towed out of St. Croix River:		
Lumber	feet b. m.	18,000,000
Shingles		3,000,000
Laths		5,000,000
Loose logs run on river above Stillwater	feet b. m.	46,000,000
	tons	209,000
Number of steamboats engaged in rafting business out of Stillwater		10

One steamboat made daily trips between Osceola, Wis., and Taylors Falls, Minn., carrying passengers and a little freight, but no information could be obtained of the amount of business done.

Z 7.

IMPROVEMENT OF MINNESOTA RIVER, MINNESOTA.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 637.

No work was done until October, 1909, the plant having been in use on the improvement of the St. Croix River. At that time the dredge *St. Croix* and barges were brought to the Minnesota River. A channel 1,100 feet long and 30 feet wide, with a low-water depth of 5 feet, was dredged just above the site of the old dam, about 3,600 cubic yards of material being removed. A brush and stone wing dam, 290 feet long, was built about 700 feet above the site of the old dam. In this dam 177 cords of brush fascines and 228 cubic yards of rock were used. Owing to lack of funds work was suspended in February, 1910, and the plant laid up.

The river and harbor act approved March 3, 1909, authorized the use of funds appropriated for snagging in the Mississippi River for the removal of snags and other obstructions to navigation in the Minnesota and other rivers tributary to the Mississippi. Under the terms of this act the snag boat *David Tipton* was employed at the beginning of the year. Details of the work accomplished will be found in the report for the Rock Island (Ill.) district.

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[a] Exclusive of the balance unexpended July 1, 1910.

Statement of expenditures during the year.

Dredging	$387.84
Care of boats and property	366.92
Repairs to fleet	104.73
Fuel and oils	104.49
Brush and stone dams	962.85
Subsistence	329.76
Total	2,256.59

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$2,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to December 31, 1902 (as per statement in H. Doc. No. 421 57th Cong., 2d sess.)	$135,000.00
March 3, 1905	3,000.00
March 2, 1907	2,000.00
March 3, 1909	2,000.00
June 25, 1910	2,200.00
Total	144,200.00
Returned to Treasury	21.32
Total	144,178.68

COMMERCIAL STATISTICS.

Navigation in the Minnesota River during recent years has been mostly confined to irregular trips of excursion steamers from St. Paul, Hastings, Stillwater, etc., to Shakopee, and a large number of private steam and naphtha launches from St. Paul and other places. Statistics of this business have not been furnished.

A small freight boat, however, began to run early in 1909 between St. Peter and Mankato, Minn., but no statistics could be obtained.

Z 8.

IMPROVEMENT OF RED RIVER OF THE NORTH, MINNESOTA AND NORTH DAKOTA.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 638.

Dredging was continued on the bars north of Grand Forks, N. Dak., and at Big Woods, Minn., and Warsaw, N. Dak., a total of

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[a] Exclusive of the balance unexpended July 1, 1910.

5,800 feet of cuts being made, 60 feet wide and 4 feet deep at low water. About 37,950 cubic yards of material were taken out and used in building 5,800 linear feet of training dikes. In October, 1909, the fleet was moved to Grand Forks and laid up for the winter. In May, 1910, preparations were made for hauling the boats out of the water for repairs, which are extensively needed. The river bank was graded and ways built and at the end of the year everything was in readiness for commencing repairs.

Statement of expenditures during the year.

Repairs to boats and machinery	$773.78
Dredging and snagging	2,666.91
Subsistence	874.08
Fuel and oils	450.54
Care of boats and property	620.12
Inspection and St. Paul office expenses	416.91
Total	5,802.34

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $7,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to December 31, 1902 (as per statement in H. Doc. No. 421, 57th Cong., 2d sess.)	$313,000
April 28, 1904 (allotment)	1,623
March 3, 1905	9,000
March 2, 1907	15,000
March 3, 1909	7,500
June 25, 1910	7,500
Total	353,623

COMMERCIAL STATISTICS.

Red River of the North.—Two steamboats of 25 and 100 tons burden and about 30 inches draft, with a fleet of 11 barges, were operated on the river from Grand Forks, N. Dak.. Total freight carried, 4,300 tons; passengers, 9,000.

Red Lake River.—Four steamboats and one gasoline launch carried general merchandise and passengers between Thief River Falls and points on Red Lake, and assisted in hauling rafts of lumber and logs. The number of passengers carried was about 1,000, and the amount of freight 400 tons. About 40,000,000 feet b. m. of logs were floated down the river, their weight being about 180,000 tons and their value about $880,000.

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[a] Exclusive of the balance unexpended July 1, 1910.

Z 9.

IMPROVEMENT OF WARROAD HARBOR AND WARROAD RIVER, MINNESOTA.

The approved project will be found in the Annual Report of the Chief of Engineers for 1910, Part 1, page 640.

The work was continued on the jetty at the outer end of the dredged channel and completed about the end of September. This jetty has now its full length of 700 feet. The adjoining channel was dredged for 600 feet, the greater part being to a width of 175 feet. About 22,200 cubic yards of material was taken out, a great deal of it being discharged onto the new dike. Early in October the fleet was laid up for the winter. In May, 1910, the dredge was taken to Kenora, Ontario, hauled out, repaired, recalked, and repainted.

Statement of expenditures during the year.

Dredging	$1,306.17
Subsistence	1,100.60
Outfit of dredge	9.09
Repairs	767.98
Fuel and oils	25.13
Care of boats and property	547.22
Protective dike	1,645.33
Inspection and St. Paul office expenses	942.18
Total	6,343.70

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $2,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 3, 1899	$3,000
June 13, 1902	45,000
March 3, 1905	35,000
March 2, 1907 (allotment)	4,000
March 3, 1909	4,000
June 25, 1910	7,700
Total	98,700

COMMERCIAL STATISTICS.

On Lake of the Woods there are at present 25 or more registered Canadian boats, ranging from 30 to 486 tons burden, any of which can now visit Warroad Harbor.

The United States boats which visit Warroad Harbor are the propellers *Na-Ma-Puk* and *Knute Nelson*, the former about 65 feet long and 24 tons burden and the latter about 80 feet, 40 tons; 2 sailing vessels; and 6 gasoline boats.

The foreign vessels were the steamers *Wapata*, 60 feet long, 20 tons; *Daisy Moor*, 55 feet long, 20 tons; *Row*, 50 feet long, 13 tons; and *Otter*, 55 feet long.

A total of 2,732 tons of general merchandise and 8,140 passengers were carried during the season of 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

Z 10.

SURVEY OF OTTERTAIL LAKE AND OTTERTAIL RIVER, RED LAKE AND RED LAKE RIVER, MINNESOTA, AND BIG STONE LAKE AND LAKE TRAVERSE, MINNESOTA AND SOUTH DAKOTA.

The approved project will be found in the Annual Report of the Chief of Engineers for 1910, Part 1, page 642.

No work was done during the year.

No additional funds are needed.

It is my opinion that the survey of Ottertail Lake and Ottertail River, Red Lake and Red Lake River, Minnesota, and Big Stone Lake and Lake Traverse, Minnesota and South Dakota, are worthy of further work to the extent of taking observations during the next flood.

APPROPRIATIONS AND ALLOTMENTS.

By act—	
Passed June 3, 1896 (allotment for Big Stone Lake, etc)	$2,500
Approved March 3, 1899:	
Appropriation for Big Stone Lake, etc	5,000
Appropriation for Red Lake and Red Lake River	5,000
Appropriation for Ottertail Lake, etc	3,000
Approved June 13, 1902 (allotment for continuing surveys)	10,000
Total	25,500

Z 11.

GAUGING MISSISSIPPI RIVER AT OR NEAR ST. PAUL, MINNESOTA.

The approved project will be found in the Report of the Chief of Engineers for 1910, Part 1, page 642.

No work was done during the year. The expenditures were for liabilities incurred during the fiscal year 1909.

ALLOTMENTS.

For fiscal year ending June 30—		For fiscal year ending June 30—	
1889	$900.00	1903	$500.00
1890	600.00	1904	500.00
1891	900.00	1905	500.00
1892	900.00	1906	500.00
1893	500.00	1907	500.00
1894	500.00	1908	500.00
1895	500.00	1909	500.00
1896	500.00		
1897	500.00	Total allotted	10,300.00
1898	500.00	Returned to Treasury	2,538.20
1900	500.00	Total expended	7,761.80

APPENDIX A A.

IMPROVEMENT OF RIVERS AND HARBORS IN THE KANSAS CITY, MISSOURI, DISTRICT.

REPORT OF MAJ. EDWARD H. SCHULZ, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Missouri River.
2. Osage River, Missouri.
3. Gasconade River, Missouri.
4. Bank preservation at Fort Riley Military Reservation, Kansas.

United States Engineer Office,
Kansas City, Mo., July 18, 1910.

Sir: I have the honor to submit herewith my annual report for the fiscal year ending June 30, 1910, upon the improvement of the Missouri, Osage, and Gasconade rivers, and bank preservation at Fort Riley, Kansas.

Very respectfully,
Edward H. Schulz,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

A A 1.

IMPROVEMENT OF MISSOURI RIVER.

The river from the mouth to Omaha was in local charge of Assistant Engineer G. C. Haydon during the entire year, and from Omaha to Fort Benton to October 7, 1909, and since that date in local charge of Assistant Engineer Fred W. Honens.

Extracts from the reports of these assistants are embodied in the following:

(A) GENERAL IMPROVEMENT.

The improvement work on the Missouri River during the fiscal year has consisted in the maintenance of existing works, construction of new works as approved, and in snagging.

The river and harbor act of March 3, 1909, appropriated the following for work on the Missouri River:

Missouri River from the mouth to Fort Benton, Mont.

For plant and boat yards	$155,000
For dikes and revetment	400,000
Total	555,000

which was allotted as follows:

For plant and boat yards.		
Kansas City to the mouth	$75,000	
Kansas City to Sioux City	40,000	
Sioux City to Fort Benton	40,000	
		$155,000
For dikes and revetments.		
Kansas City to the mouth	275,000	
Kansas City to Sioux City	75,000	
Sioux City to Fort Benton	50,000	
		400,000
Total		555,000

The work during the year has been as follows:

FROM MOUTH TO KANSAS CITY, MO.

Snagging.—At the beginning of the present fiscal year the snag boat *Missouri* was tied up at St. Louis, Mo., pending the fall of high water and the installation of new capstan machinery.

Four capstans ($1,400) and four capstan engines ($1,800) were installed at a cost of $3,200; also one set of iron sheaves with wire-cable rigging. She began snagging operations September 1, arriving at Kansas City, Mo., November 3. This was a record trip in point of thoroughness of operations and the greatest number of snags removed. On November 18 an inspection was made from Hulls Point to Gasconade by the National Waterways Commission. She arrived at Gasconade, Mo., November 20, 1909, and prepared for winter quarters.

The *Missouri*, on April 26, 1910, resumed operations at the mouth of the Gasconade River, arriving at Kansas City, Mo., May 27, and continued snagging except during high water, until close of fiscal year, which found her at the mouth of Moreau River (mile 146).

During the current year the boat worked over 392 miles of river and ran 1,246 miles. She removed from the channel 1,072 snags and 24 wrack heaps, and felled 1,173 trees from caving banks.

The snag boat *James B. McPherson* cleared from Kansas City, Mo., July 1, 1909, and arrived at St. Louis, Mo., July 2, and tied up pending the fall of high water. Repairs were made, and on July 28 she cleared from St. Louis for snagging operations. An inspection was made by the Chief of Engineers from Kansas City to Boonville, Mo., August 31 to September 2. She then returned to Kansas City, Mo., arriving September 5, and departed on September 8 for upper river snagging operations.

She was returned from the upper river to the Gasconade boat yard for winter quarters, arriving November 5, and proceeded to St.

Louis November 21 with National Waterways Commission. She was placed in winter quarters at Gasconade boat yard November 25.

The work of the boat on this section of the river was as follows:

Removed from the channel 75 snags and 2 wrack heaps, and felled 136 trees from caving banks. Miles traveled downstream, 730; upstream, 804.

Plant—Gasconade boat yard.—After the flood of 1909 the buildings and yard were cleared of mud and débris. From August to November a force of carpenters was occupied in building barges and repairing plant, and force of laborers was occupied in handling material, tools, and supplies for construction parties, and wrecking four condemned barges.

The new plant built was as follows:

2 mattress barges, 30 by 80 by 4 feet, at a cost of $1,974.42 each	$3,948.84
1 pile-driver barge, 19 by 76 by 4½ feet	1,555.38

The old plant was remodeled and repaired as follows:

1 pile driver, 1 100-foot barge for use as a mattress boat.
4 barges, 100 feet, and steam tender *Atalanta*, at a cost of $4,957.54.

On November 30, 1909, the *Atalanta* cleared from Gasconade to help tow the St. Joseph, Mo., plant to the boat yard. She arrived at Missouri City December 6, and on account of running ice and protracted gorge was unable to proceed farther upstream. December 8 the river froze solidly and the boat was put in the best winter quarters possible under the conditions. On January 26 she was caught and wrecked in an ice gorge.

During January and February the snag boats *Missouri* and *McPherson* were put in repair.

On the *Missouri* the repairs consisted of reflooring the steel deck under the battery of boilers and putting in new bedplates. The cylinders for pumps and engines were refitted and put in working order and machinery generally overhauled, at a cost of $2,671.15.

On the *McPherson* the repairs consisted of a general repair to roof and pilot house. A new pitman was made and the wheel straightened up and repaired at a cost of $1,681.80. An electric-light plant was installed, including necessary wiring and cabin lights; also deck and search light, the contract price for which was $1,996.40.

Since March a force of carpenters and laborers have been employed in repairing the St. Joseph plant. The pieces to be repaired have been pulled out on the ways and calked and all but one piece relaunched, as follows:

1 pile driver, hull rebuilt at a cost of $1,638.56.
2 quarter boats.
4 100-foot barges and steam tender *Arethusa*, on which was also installed a new boiler at cost of $839.50.

The expenditure during the fiscal year for repairs to vessels, barges, etc., at the Gasconade boat yard, labor, material, and supplies amount to $37,983.73.

The 8 barges, 20 by 100 by 5 feet, constructed at the United States engineer boat yard, at Rock Island, Ill., for use on the Missouri River, have been delivered, at a cost of $12,000. Plans and specifications were submitted for approval on May 9 for a steel-hull towboat, 24 feet beam, 116 feet length, and 5 feet depth of hold.

Authority was asked March 22, 1909, approved April 2, 1909, to enter into negotiations for the purchase of land at Gasconade, Mo., for use as a boat and storage yard. A survey was made and a description by metes and bounds submitted April 30, 1909, which were approved by the Secretary of War May 10, 1909. Final negotiations were closed June 10, 1910, on which date payment was made and the boat yard, 17.86 acres, became the property of the United States, at a consideration of $1,786.

CONSTRUCTION OF DIKES AND REVETMENT.

The conditions which have obtained on the river, frequent bank full rises and early run of ice, with attending block of channel, were the most unusual in the history of this river improvement, causing much delay and loss of unfinished work both to the Government and contractors.

WORK UNDER GOVERNMENT SUPERVISION.

First reach.—Extending from Murray Bend, mile 155, to Gasconade River, mile 110. This is the reach of 45 miles systematically improved by the old Missouri River commission at a cost of $56,000 per mile. In accordance with project approved May 29, 1909, for repair to existing work and such new work as was recommended, construction party No. 1 was organized August 20, and No. 2 organized October 20, and worked until December 15. This party (No. 1) was reorganized April 10, 1910, and work is now in progress. Repairs and work on dikes and revetment were carried on at 21 places on this reach, aggregating 2,122 feet of dike at a cost of $27,922.38, or $13.16 per linear foot; and 1,792 feet of revetment at a cost of $12,104.97, or $6.76 per linear foot. Overseer J. J. Streeter was in local charge of the work.

The work in detail is as follows:

No. 96. Revetment extension, right bank (mile 110), (cost includes 200 feet of repairs). Begun August 20, completed October 15, 1909—475 linear feet at cost of $4,025.39.

No. 94. Repair to dike, right bank (mile 111). Begun November 20, completed November 22, 1909. Root refilled with brush and stone at cost of $263.12.

No. 93. 3-row dike extension, left bank (mile 112), also 250 feet repairs to old dike and 90 feet abattis across draw at root. Begun October 28, completed November 18, 1909—100 linear feet at cost of $1,239.95.

No. 92. New 3-row dike, left bank (mile 113). Begun October 6, completed October 27, 1909—170 linear feet at cost of $1,825.08.

No. 89. Revetment extension. Head Heckmann Island (mile 114). Begun September 3, completed November 19, 1909—556 linear feet at a cost of $3,667.27.

No. 88. New 3-row dike across Heckmann Island chute (mile 113). The project was for 700 linear feet. The piles for this dike were driven in place, 690 linear feet. On May 7 the rise had reached such a stage and drift accumulated to such an extent that 360 linear feet of dike was destroyed. The gap was again closed when, on June 3, another section of 200 linear feet was destroyed by a like cause. The ends were then braced and work closed until a low stage, and will be completed this season. Began April 10, closed June 7, 1910. Expended $7,638.92.

No. 87. 3-row dike extension, left bank (mile 114). Old mattress in place. Begun October 14, completed October 20, 1909—150 linear feet at a cost of $776.31. This work has since been destroyed.

No. 86. 3-row dike extension, left bank (mile 115). Begun September 20, completed November 19, 1909—140 linear feet at cost of $2,006.10.
No. 85. 3-row dike extension, left bank (mile 115). Begun September 27, completed October 20, 1909—70 linear feet at cost of $1,112.33.
No. 84. 3-row dike extension, left bank (mile 115). Begun September 20, completed October 9, 1909—70 linear feet at cost of $715.14.
No. 83. 3-row dike extension, right bank (mile 116). Begun November 18, completed April 10, 1910—40 linear feet at cost of $212.50.
No. 82. 3-row dike, break repaired, right bank (mile 116). Cost includes 250 feet of repair. Begun November 6, completed November 27, 1909—82 linear feet at cost of $955.14.
No. 81. 3-row dike extension, right bank (mile 117). Begun November 2, completed November 30, 1909—90 linear feet at cost of $1,200.27.
No. 76. 3-row dike extension, right bank (mile 118). Begun December 1, completed December 28—90 linear feet at cost of $424.14.
No. 77. New 3-row dike, right bank (mile 118). Begun November 23, completed December 26, 1909—200 linear feet at cost of $2,065.71.
No. 60. New 3-row dike, left bank (mile 129, 100 feet destroyed by ice). Begun December 1, 1909, completed June 30, 1910—210 linear feet at cost of $3,099.48.
No. 59. Revetment repair, left bank (mile 130). Begun June 10, completed June 30, 1910—423 linear feet and 188 linear feet bank paved at cost of $3,471.64.
No. 58. Revetment extension, left bank (mile 131). Begun June 23. Bank to be paved 338 linear feet. Cost $940.67.
No. 57. New 3-row dike, right bank (mile 132). Begun October 22, 1909, completed June 30, 1910—120 linear feet at cost of $1,741.34.
No. 56. 3-row dike extension, right bank (mile 132). Begun October 22, 1909, completed June 30, 1910—50 linear feet at cost of $477.54.
No. 55. 3-row dike extension, right bank (mile 132). Begun October 22, 1909, completed June 30, 1910—150 linear feet at cost of $2,169.51.

The work opposite Hermann, Mo., has been canceled on account of the failure of cooperation by the citizens, and later the chute has filled in at the head from natural causes.

CONTRACT WORK.

History.—In accordance with project approved May 29, 1909, for contract work, bids were advertised July 13 and opened August 16, 1909, and those for items 1, 2, 4, 5, and 7 were recommended for acceptance August 27, and approved September 8. The bids on items Nos. 3, 6, 8, and 9 were considered high and recommended to be readvertised. The latter items were readvertised September 4 and opened September 14 and approved September 23.

Inspections were made of the conditions at Howard Bend and Slaughter House Chute, with the result that authority was asked for the construction of an additional dike at Howard Bend and the canceling of the project for item 6 in Slaughter House Bend, approved October 6. Bids for the Howard Bend additional dike were advertised October 9 and opened October 19 and approved October 27.

Inspection was made of the conditions at Nigger Bend on October 6, and it was found that since the recession of high water it would be necessary to extend the revetment beyond the 2,400 feet contracted for. Authority for extension was obtained and final total length was 3,365 feet.

Inspection was made of the conditions at Lexington, Mo., on April 22, and it was found that the depth of water was so great that it was impracticable and inadvisable to construct dike A (1,500 linear feet) to a greater length than 960 linear feet. Authority was asked April 22 to enter into a supplemental agreement to reduce the length, which was approved May 11, 1910.

At Hills Bend, item 3, No. 3, the necessity for the dike, as approved in the detailed project, has changed by the forming of a sand bar above and which extends below the proposed location; hence authority was asked April 25 for the construction of this dike as No. 3 in Waverly Bend. A supplemental agreement, approved May 26, was made to cover the case.

The following contracts were also in force:

GLASGOW, MO.

To prevent the threatened bank erosion at the point on right bank just above Glasgow, Mo., thus forming a sand bar in front of the town and the destruction of the Chicago and Alton Railroad bridge, was the subject of correspondence between the citizens of Glasgow and the Chicago and Alton Railroad Company with the Secretary of War, in which the railroad company agreed to pay one-half the cost. A report of conditions and project was submitted November 26 and approved December 16. To expedite the work it was recommended on January 4 that the railroad company be allowed to construct their half of the work on government plans and the United States to contract for the other half, the cost to the United States not to exceed $19,000 and the railroad company to furnish an equal amount. The railroad work is to consist of 640 feet of 3-row dike and about 700 feet of revetment, with 2-row land dike, and the United States work to consist of 1,215 feet of revetment and 2-row land dike.

Wilhoite Bend, Mo.—To prevent an undesirable cut-off of the river at Wilhoite Bend, by which the river might adopt a new route by the Chariton River, in lieu of the present route by Cambridge. A levee 5,500 feet long and 15-foot crown was projected and approved. An emergency allotment was made December 15. The lowest bid was 13.75 cents per cubic yard of levee work and 42 cents per square yard of riprap paving of 6 inches in thickness.

The work accomplished is as follows:

Item 1:	
No. 2. Fishing River Bend, above Napoleon, Mo., miles 346 and 348 above mouth—	
1 pile dike, 3-row, 250 linear feet, at $12.75	$3,187.50
1 pile dike, 3-row, 250 linear feet, at $12.75	3,187.50
Work begun November 20, completed April 12, 1910.	
No. 1. Near head of Blue Mills Island, mile 368 above mouth—	
1 pile dike, 3-row, 200 linear feet, at $12.75 linear foot	2,550.00
Work begun November 9, completed December 1, 1909.	
Item 2:	
Opposite Lexington, Mo., mile 322 above mouth—	
2 pile dikes, 3-row, 1,160 linear feet, at $11.75 per linear foot	$13,630.00
2 2-row cross dikes, 270 linear feet, at $6.77	1,827.90
1,148 linear feet of extra-length piles, at 30 cents per linear foot	344.40
7 cords willow brush, at $2 per cord	14.00
6 cubic yards stone, at $1.50 per cubic yard	9.00
	15,823.30

Item 2—Continued.

The lengths of dikes in this system were as follows:

	Linear feet.		Feet
Dike No. 1, 3-row	200		
Dike No. 2, 3-row	960	Distance 1 to 2	300
Cross dike, 2-row	170		
Cross dike, 2-row	200	Distance protected below 2	1,960
Total dike	1,160	Total bank protected	2,260

Work began October 13, 1909; completed May 7, 1910;

Item 3:

No. 4. Head Prunty Island, mile 282 above mouth—

1 pile dike, 3-row, 250 linear feet, at $12.75 per linear foot		$3,187.50

Work began May 31; completed June 9, 1910.

Nos. 2 and 3. Waverly Bend, mile 292 above mouth—

4 pile dikes, 3-row, 650 linear feet in all, at $12.75 per linear foot		$8,287.50
79.6 cords brush, at $2.50	$199.00	
99.7 cubic yards stone, at $2	199.40	
		398.40
		8,685.90

The lengths of dikes in this system were as follows:

	Linear feet.		Feet.
Dike No. 1	100		
Dike No. 2	100	Distance 1 to 2	600
Dike No. 3	200	Distance 2 to 3	650
Dike No. 4	250	Distance 3 to 4	1,300
		Protected below 4	1,000
Total dike	650	Total bank protected	3,550

Work began April 28; completed June 8, 1910.

No. 1. Baltimore Bend, mile 308 above mouth—

2 pile dikes, 3-row, 460 linear feet in all, at $12.75 per linear foot	$5,865.00

The lengths of dikes in this system were as follows:

	Linear feet.		Feet.
Dike No. 1	230		
Dike No. 2	230	Distance 1 to 2	1,350
		Distance protected below 2	1,000
Total dike	460	Total bank protected	2,350

Work began April 12; completed April 28, 1910.

Item 4:

No. 2. Wilhoite Bend, mile 245 above mouth—

1 pile dike, 3-row, 200 linear feet, at $12.40 per linear foot.
48 piles in place, 150 linear feet.
Bank graded, 55 linear feet.
Mattress woven, 110 linear feet.
Work began June 28 and will be completed about July 11.

No. 1. New Frankfort, Mo., mile 252 above mouth—

1 pile dike, 3-row, 500 linear feet, at $12.20 per linear feet	$6,100.00

Work began June 10; completed June 27, 1910.

Item 5:

Nigger Bend, mile 224 above mouth—

2,400 linear feet revetment, at $7.90	$18,960.00
965 linear feet revetment, at $8.90	8,588.50
3,365 linear feet revetment cost	27,548.50

Work began October, 1909; completed May 27, 1910.

Item 7:

Hartsburg, Mo., mile 167 above mouth—

9 pile dikes, 3-row, 1,640 feet in all, at $13.25 per linear foot, and 1,928 linear feet of extra-length piles, at 30 cents per linear foot; $10,000 of this amount was paid by citizens of Hartsburg. The cost to the United States was $12,308.40.

Work began November 7, 1909, and completed May 24, 1910.

The lengths of the dikes in this system were as follows:

	Linear feet.		Feet.
Dike No. 1	110		
Dike No. 2	190	Distance 1 to 2	450
Dike No. 3	150	Distance 2 to 3	950
Dike No. 3a	110	Distance 3 to 3a	650
Dike No. 4	150	Distance 3a to 4	350
Dike No. 5	220	Distance 4 to 5	1,135
Dike No. 6	220	Distance 5 to 6	1,325
Dike No. 7	220	Distance 6 to 7	1,080
Dike No. 8	270	Distance 7 to 8	1,010
		Distance protected below 8	1,000
Total dike	1,640	Total bank protected	9,950

Item 8:

No. 2. Below St. Charles, Mo., mile 24 above mouth—

1 pile dike, 3-row, 250 linear feet, at $15 per linear foot $3,750

Work began May 14; completed June 15, 1910.

No. 1a. Howard Bend, mile 35 above mouth—

1 pile dike, 3-row, 250 linear feet, at $15 per linear foot 3,750

Work began April 1; completed May 6, 1910.

No. 1. Howard Bend, mile 37 above mouth—

1 pile dike, 3-row, 250 linear feet, at $15 3,750

Work began February 12; completed April 9, 1910.

Item 9:

Pelican Bend, mile 14 above mouth—

2,000 linear feet revetment, at $8.25 per linear foot—

	Linear feet.
Bank graded	1,620
Bank paved	1,060
Mattress woven	1,485
Mattress ballasted	1,290

Work began May 14 and will be completed about July 18, 1910.

Emergency appropriation, Wilhoite Bend, levee on left bank, above Glasgow, Mo., mile 247 above mouth:

75,000 cubic yards earth levee, at 13.75 cents per cubic yard.

5,600 linear feet slope paving, at 42 cents per square yard. No work done.

Levee work:

	Cubic yards.
Station 0 to 10, 100 per cent in place	17,475
Station 10 to 20, 20,868 cubic yards, 56 per cent in place	11,686
Station 20 to 30, 17,305 cubic yards, 43 per cent in place	7,441
Total in place	36,602

Work began April 21 and will be completed about August 31, 1910.

In conjunction with the Chicago and Alton Railway Company above Glasgow, Mo., right bank, mile 239 above mouth:

Work to be done by United States is—

1,215 linear feet of revetment, at $8.90 per linear foot.

1,215 linear feet of 2-row land dike, at $5.50 per linear foot.

Revetment work—

	Linear feet.
Bank graded	785
Bank paved	50
Mattress woven	710
Mattress ballasted	550

PROJECT AND ESTIMATE.

The repairs to existing works on the first reach, extending from Murray Bend to Gasconade River, will be continued and the uncompleted work under contract will be completed as provided for in the project of April 29, 1909, for the expenditure of appropriation by the river and harbor act of March 3, 1909.

The river and harbor act of June 25, 1910 (see subhead *b*) appropriated $1,000,000 for continuous improvement work on this section of the river, but as yet no project has been submitted. Estimate is made under subhead (*b*).

IMPROVEMENT WORK OTHER THAN GOVERNMENT WORK.

The Chicago, Burlington and Quincy Railway Company built about 1,200 linear feet of standard revetment on left bank just above their bridge at Bellefontaine, Mo., mile 8 above mouth. Approximate estimate, $7,200.

An association of farmers contributed $10,000 in building a system of 9 3-row dikes, 1,640 linear feet on left bank near Hartsburg, Mo., mile 168 above mouth. Total cost, $22,308.40.

The Missouri Pacific Railway Company built 3,700 linear feet of willow fascine revetment, reinforced by Neale system of dikes on right bank just above Petite Saline Creek, mile 185 above mouth, at a cost of $23,500, and 2,200 linear feet of willow fascine revetment on right bank at Myrick, Mo., mile 325 above mouth, at a cost of $8,000. The improvement work done by this company has but little effect on navigation improvement, as their work is generally near the south line of bluffs.

The Chicago and Alton Railway Company built 640 linear feet of standard 3-row dike across a bight, contract price $13.75 per linear foot, and was extended 400 linear feet by standard revetment, contract price $8.90 per linear foot. Cost to date, $12,368.90, and have under construction 300 linear feet of standard revetment at $8.90 per linear foot and 130 linear feet of 3-row land dike at $5.50 per linear foot and 100 linear feet of 3-row dike below the standard 3-row dike, to protect extended revetment, at $9.50 per linear foot. This location is on right bank just above Glasgow, Mo., mile 239 above mouth. Total to be expended by Chicago and Alton, $20,000.

The Wabash Railway Company built 1,100 linear feet of standard revetment, 70-foot mattress, and two 3-row standard pile dikes, 250 feet each, to fill in the bights and protect revetment on left bank near De Witt, Mo., mile 265 above mouth. . Approximate cost, $12,000. Also 7,250 linear feet standard revetment, 70-foot mattress, and three 3-row standard pile dikes, 250 feet each, to fill in the bights and protect revetment on left bank at Hulls Point, Mo., mile 354 above mouth, at a contract cost of $44,081.

The Prarie Oil and Gas Company built 500 linear feet of standard revetment and two 3-row standard pile dikes, 200 linear feet each, to protect the caving bank above their pipe line on left bank at mouth of Fishing River, mile 348 above mouth, at a cost of $8,000.

FROM KANSAS CITY, MO., TO SIOUX CITY, IOWA.

Snagging.—On September 8, 1909, the snag boat *James B. McPherson* left Kansas City, working upstream to Sioux City, arriving there October 6. She departed downstream October 13, arriving at Kansas City October 28, and was sent to the Gasconade boat yard for winter quarters and general repairs.

She was again put in commission April 7, 1910, and was used for towing barges and dike material until June 2, 1910.

From May 16 to June 2, inclusive, she towed dike material for the Craig dikes and did such snag work as she could in the vicinity. On June 3 she arrived at St. Joseph, Mo., and left on June 7, snagging toward Omaha, Nebr. The end of the year finds her tied at Whippoorwill Bluffs, mile 785 above the mouth. The work of the boat for this section of the river was as follows:

Miles run in towing barges	1,000
Miles of river worked over upstream	1,019
Miles of river run downstream	697

Removed from the channel 518 snags and 6 wrack heaps, and felled 1,477 trees from caving banks.

Plant.—The construction of plant used on this section of the river was in such poor condition that it was necessary to make repairs. At the close of operations the plant was taken in tow December 2 for the boat yard at Gasconade, but on account of the early run of ice was unable to make the trip and the entire plant was put in winter quarters December 5 at the mouth of Kickapoo Creek, near Wade, Kans. After the spring breakup of ice the plant was towed to Gasconade March 7 to 19, inclusive.

CONSTRUCTION OF DIKES AND REVETMENT.

During the season July 1 to November 1, 1909, the work was continued under old projects with the following work accomplished:

Bank erosion had set in on old revetment at head of dike across Pillow Eddy, at foot of Belmont Bend, above St. Joseph, Mo., and to prevent the bank caving and the river getting in behind the dike the bank was revetted and 193 linear feet of bank paved in July at a cost of $663.50.

Repair of revetment No. 2 in Belmont Bend, 460 linear feet, at a cost of $7.60 per linear foot; total, $3,495.86.

Repair of revetment No. 3 in Belmont Bend, 465 linear feet, at a cost of $7.64 per linear foot; total, $3,551.60.

Repair of revetment No. 4 in Belmont Bend, 220 linear feet, at a cost of $7.59 per linear foot; total, $1,669.80.

Repair of single row parallel dike No. 1 in Belmont Bend, 247 linear feet, at a cost of $6.18 per linear foot; total, $1,526.35.

Repair of single row parallel dike No. 2 at head of Belmont Bend, 300 linear feet, at a cost of $6.24 per linear foot; total, $1,873.15.

Near St. Joseph, Mo. (mile 488 above mouth).—In accordance with project approved June 25, 1909, for the repair to revetment in Bonton Bend, 347 linear feet of revetment was built in December, 1909, at a cost of $7.36 per linear foot, a total of $2,554.91. The project, as approved, was a 3-row 500-linear-foot concrete dike. Work on the concrete dike was begun November 1 by the casting of piles. Operations were suspended December 1, 1909, and resumed for the month of April, 1910. Total piles cast to date 153, 12 by 12 inches, and in lengths from 35 to 50 feet. Total linear feet of piles cast, 6,564. As the casting of piles and construction of dike is not completed a statement of cost will be fully reported later.

Near Craig, Mo. (*left bank, mile 550 above mouth.*)—On account of changed conditions, and to break up eddy action in three bights, the plan of 2 pile dikes, 200 linear feet each, was changed, and 3 pile dikes—No. 1, 95 linear feet, No. 2, 105 linear feet, and No. 3, 150 linear feet, a total of 350 linear feet in all—were built. Work on these dikes commenced by towing the plant from St. Joseph on April 16, and completed June 30, 1910, at a cost of $4,623.70.

At Nebraska City, Nebr.—The materials for the construction of 3 pile dikes, 3-row, 200 linear feet each, and repair to old dike, have been assembled, and the work will be done the coming season. Overseer John S. Campbell was in local charge of work at St. Joseph, Craig, and Nebraska City.

At Council Bluffs, Iowa.—A breach in the revetment near the Iowa end of the Illinois Central Railway bridge was repaired by constructing a standard revetment extending 300 linear feet immediately above the bridge. The stitch of this mattress was subsequently picked up by the Illinois Central Railway Company and extended downstream about 200 linear feet under and beyond their bridge. A second breach, beginning about 1,500 feet below the bridge and extending downstream, was likewise repaired by constructing a standard revetment 740 feet long.

Both pieces of work were constructed during the winter. Dynamite was used in grading the bank; the mattress was woven on the ice and sunk by ballasting, no plant being required for the work. Operations were started January 14, and the work completed February 28, 1910. Cost, exclusive of rock already on hand, 1,040 linear feet, at $4.35 per linear foot, $4,521.41.

At Decatur, Nebr.—To protect the caving bank in the bend on which the town of Decatur is located two standard 3-row pile dikes, 400 linear feet in all, were constructed. The nearest railroad being at a distance of 18 miles, the materials for the dikes were delivered at Sioux City, Iowa, and barged to the site of the work. The work was started on April 9, but owing to the difficulty in securing labor it was not completed until June 9, 1910. The total cost of the two dikes was $6,458.21, or $16.15 per linear foot. Overseer Clarence Douthett was in local charge.

Sioux City, Iowa.—The old revetment on the river front below the combination bridge, just above the longitudinal dike, which has been undermined and practically destroyed, was replaced with a new standard revetment 500 feet long, costing $3,952.28, or $7.90 per linear foot. The work was started on October 7 and was executed in connection with the repairs to the longitudinal dike and the construction of a new 3-row pile dike, 200 feet long, at the foot of Iowa street, all of which work was completed on December 27, 1909. The cost of the repairs was $1,475.50, and of the new dike, 200 linear feet, was $2,769.26, or $13.84 per linear foot.

All materials except brush have been purchased and delivered for a second 3-row dike near the foot of Howard street.

IMPROVEMENT OTHER THAN GOVERNMENT WORK.

At Council Bluffs, Iowa, the Illinois Central Railway Company picked up the stitch of the mattress constructed by the Government just above the Iowa side of their bridge between Council Bluffs, Iowa, and Omaha, Nebr., and extended the revetment 210 feet downstream, making their mattress 70 feet wide. The improvement cost the railroad company $2,035.08, or $9.07 per linear foot. Overseer Clarence Douthett in local charge.

Stock-yards dike, Sioux City, Iowa.—The Sioux City Stock Yards Company constructed a dike on the left bank of the Missouri River, just above the mouth of the Floyd River, to protect the plant of the Iowa Rendering Company. Permission having been obtained, the government plant was turned over to them. Lumber and other materials for a dike 200 feet long, after the plan of the standard 3-row gvoernment dike, were purchased and all labor paid for by the stock-yards company. Work was started on May 24 and completed on June 18, 1910, at a total cost to the company of $3,906.45, or $19.43 per linear foot. The high cost is due to heavy freight on lumber paid for by the Sioux City Stock Yards Company. W. H. Anderson, overseer, was in local charge of the work.

The Chicago, Burlington and Quincy Railway Company built about 12,000 linear feet of standard revetment on left bank below Parkville, Mo., mile 400 above the mouth, at an approximate cost of $65,000.

PROJECT AND ESTIMATE.

The repair to existing works and construction of new pile dikes at Bonton Bend, near St. Joseph, Mo., and at Nebraska City, Nebr., will be completed as provided for in the project of June 25, 1909, for the expenditure of the appropriation by the river and harbor act of March 3, 1909.

The river and harbor act of June 25, 1910, see subhead (C), appropriated $300,000 for the section of river from Kansas City to Fort Benton. No project as yet submitted and no allotments made.

FROM SIOUX CITY, IOWA, TO FORT BENTON, MONT.

Snagging.—On July 1 the snag boat *Mandan* was on the Yellowstone River en route to the site of the Reclamation Service dam (18 miles below Glendive). Proceeded July 6 downstream on an inspection trip of the river, arriving at Williston, N. Dak., on July 7. From Williston the boat started upstream for Fort Benton. Reached Judith, Mont., July 21, but did not proceed farther on account of low water. Departed downstream on July 26, snagging en route, reaching Bismarck, N. Dak., August 10. A load of piles were taken from Bismarck, N. Dak., to Pierre, S. Dak., arriving at the latter point August 23. Snagged upstream to Bismarck, remaining in that vicinity until October 4, when the boat departed downstream, reaching Sioux City, Iowa, November 4. From November 5 to December 1 towed brush for Sioux City dike, and towed plant to the Sioux River Harbor, where the boat was laid up for the winter on December 6. During the winter minor repairs were made to the machinery and deck of boat and the exterior of the boat painted. On April 2 the boat was again put in commission and was used for towing the plant and material for dike construction to Decatur, Nebr., snagging between tows.

On June 3, proceeded upstream, snagging from Sioux City, reaching Bismarck on June 24, where the operations were being carried on at the end of the year.

The snagging work of the boat for the year consisted in removing 363 snags and 77 miscellaneous obstructions and felling 363 leaning trees. During the year the boat traveled 5,204 miles, 2,420 miles upstream and 2,784 miles downstream.

Dikes and revetment.—In accordance with the project approved July 8, 1909, the following work was accomplished.

SIOUX CITY, IOWA.

In 1895 (see Annual Report Chief of Engineers, 1896, pp. 1890 et seq.) a series of 16 dikes were constructed to protect the left bank above Sioux City. The spaces between dikes were entirely filled in, but the dikes were in bad repair. The current set in against this bank and threatened to carry out the old dikes. The Chicago, Milwaukee and St. Paul Railway Company took immediate steps to protect the upper end of the work by constructing 1,750 linear feet of revetment (Annual Report Chief of Engineers, 1906, p. 1666). From this point the work was taken up jointly between the railway company and the United States, the former furnishing the materials and the latter the plant and labor for doing the work. This part was started on August 6, 1909, and 800 linear feet of bank graded, but owing to the delays in delivering materials only 750 linear feet of revetment was finished. The work was completed October 8. Later in the season the railway company extended the revetment 975 linear feet, so that now the bank is revetted from Dikes 1 to 11, inclusive, a total distance of 3,475 linear feet. The cost to the United States for labor was $2,442.14, or $3.23 per linear foot.

ELKPOINT, S. DAK.

The river started to cut in behind the dikes at Elkpoint. A foreman was sent to the place to make temporary repairs. Interested parties in the vicinity volunteered the service and furnished brush and trees. Strand and rock were furnished from old surplus stock on hand. The total amount expended was $81.53.

YANKTON, S. DAK., AND BISMARCK, N. DAK.

Materials have been purchased and delivered for repairing dikes and preparations are now being made to execute the work.

PIERRE, S. DAK.

To contract the channel between Pierre and Fort Pierre a standard 3-row pile dike 500 feet long was started on September 8, 1909, a short distance below the Pierre water works. Owing to the low water the piles were driven only 230 linear feet of the dike. The brush being on hand, the mattress was woven and ballasted for 500 linear feet, the same being 60 feet wide. The work was delayed by the nonarrival of lumber, the bracing of dike as far as constructed being completed January 15, 1910, and the work was suspended. The dike was then extended 40 feet with brush and rock during the early part of May, and at present no further work appears necessary. The total amount expended on this dike to date, including piles, lumber, etc., for the full 500 linear feet of dike is $8,379.70, or $16.76 per linear foot.

FORT PIERRE, S. DAK.

In accordance with the project approved April 12, 1909, Dikes Nos. 2D and 4D of the Fort Pierre group (see map opposite p. 2880, Report Chief of Engineers, 1900) were repaired by filling in between the piles with alternate layers of brush and rock. The lower course consisted of fascines, which were anchored to the piles with cable. The lengths of dikes were 180 and 170 feet, respectively.

Two brush dikes, 100 and 50 feet in length, of similar construction were built near the lower end of Marions Island to protect the bank below the revetment at that part of the island. Actual work was started on these dikes on July 20, and the work completed September 22.

The cost of the four dikes was $2,462.68. The work at Pierre and Fort Pierre was in charge of O. P. Lilly, overseer.

DEAPOLIS AND EXPANSION, N. DAK., AND JUDITH, MONT.

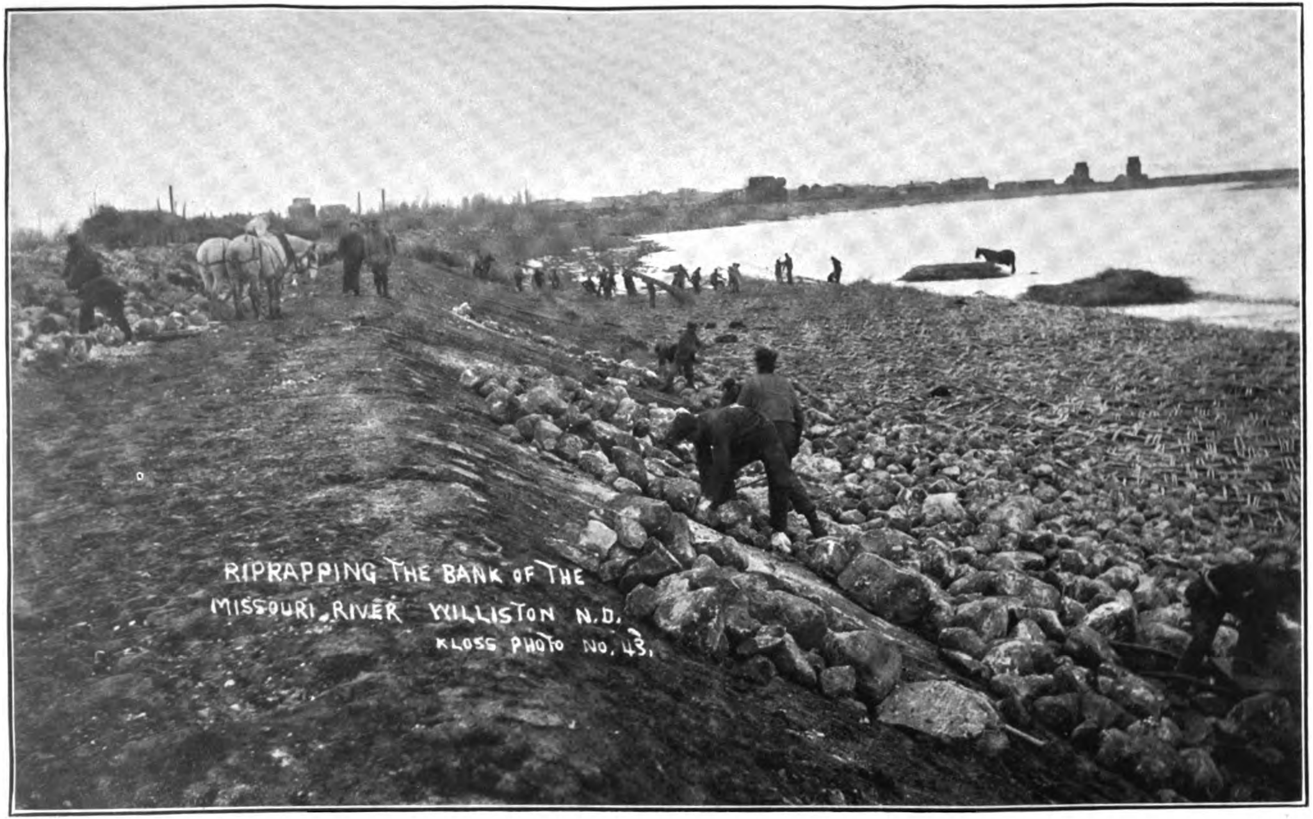
No work accomplished, although efforts were made to secure materials. An overseer is now on the ground starting operations.

WILLISTON, N. DAK.

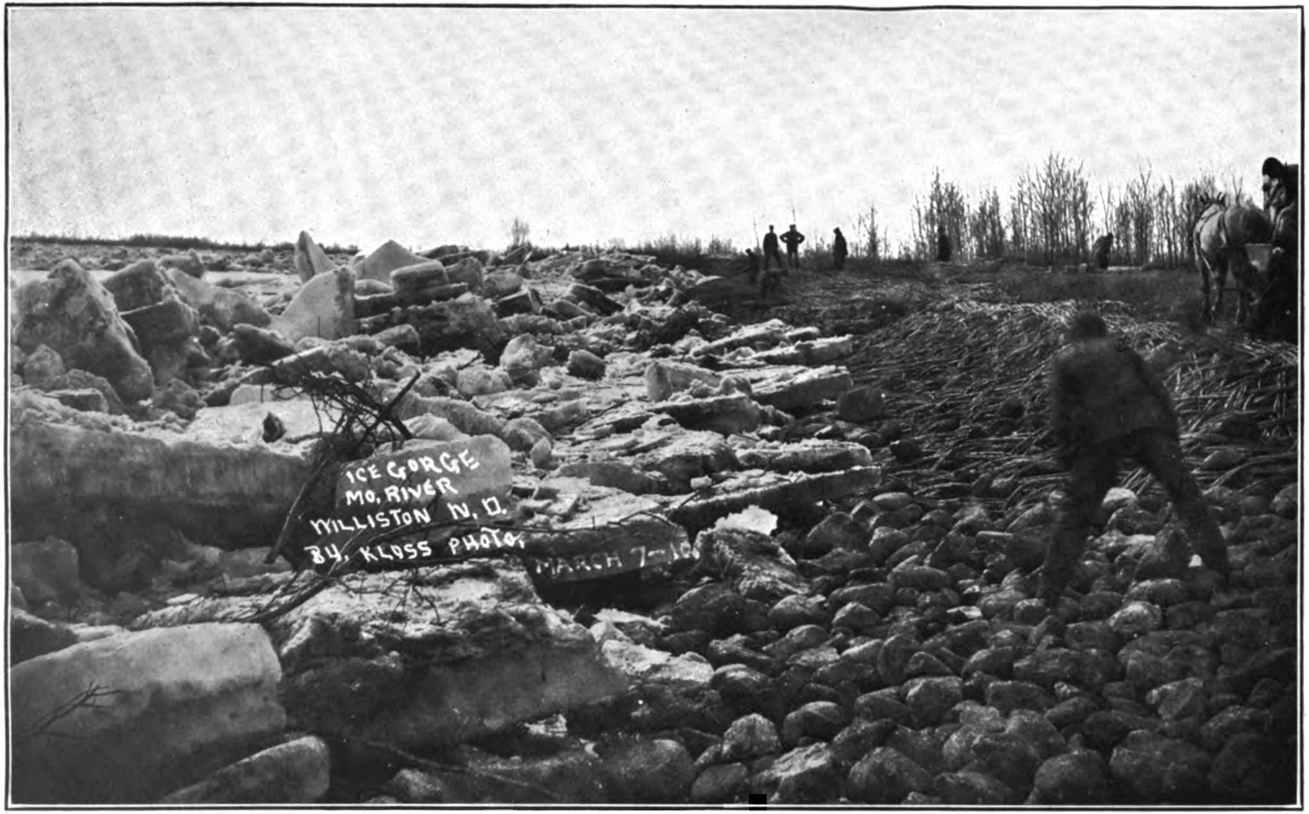
In conjunction with the city of Williston, N. Dak., and the Great Northern Railway Company the revetment on the bend in front of Williston was extended upstream 2,500 linear feet. The brush was furnished by the city; the rock and all other materials except strand and clips were furnished by the railway company.

This work was started on December 6 and was carried on during the winter, no plant being required for the job. The grading was done with slip scraper, the frozen crust being broken with dynamite (40 per cent), 800 pounds being used for this purpose. The slope of the bank at the upper end was made 1 to 2½, but was later increased to 1 on 3, and was " all cut," no filling being done.

For about 500 feet above the 3,075 feet of revetment placed during the winter of 1908–9 a slide in the bank had occurred. The mattress was 60 feet wide, except over this slide, where it was increased to 120 feet, being carried almost to the top of the bank. Granite bowlders were used for paving and ballasting. The railway company drove a number of piles for a crib dike, to protect the upper end of the revetment, and the Government had started to build the cribbing, when on March 7 the ice started to move and carried out the dike. A gorge formed, and the water rose rapidly and almost to an unprecedented height. On March 10 the ice went out with a big rise and heavy break-up. The ice plowed off some of the rock on the old revetment and broke a number of cables. The water entirely covered the bank



IMPROVEMENT WORK ON MISSOURI RIVER AT WILLISTON, N. DAK., FEBRUARY, 1910.



REVETMENT AND ICE GORGE AT WILLISTON, N. DAK., IN FEBRUARY, 1910.

where the paving was being done, and in the sudden recession of the water numerous gullies were cut into the bank. The work, including repairs to the old revetment, was completed on March 17. During the winter the minimum temperature was 44° F. below zero. Three photographs are submitted, showing construction work in progress and the ice gorge and flood of March 7, 1910.

The cost to the city of Williston for 1,663.23 cords of willows, at $1.85, was $3,243.37. The cost to the Great Northern Railway Company not yet obtained. The cost to the United States was $10,705.73, or $4.28 per linear foot, and for repairing the old revetment was $425.03. Overseer O. P. Lilly was in local charge.

FORT BENTON, MONT.

The bank in front of the town was paved for a distance of 500 feet immediately below the old revetment. The work was started on December 11 and continued to December 28. Owing to an unusual stage of water the work was not completed at the time, but will be done this summer. The cost of the work, including a small amount of repairs to the old work, was $2,499.95.

PLANT.

The three boat and supply yards at the Sioux ice harbor, near Sioux City, Iowa; at Fort Pierre, S. Dak.; and Rockhaven, N. Dak., were maintained, a watchman being in charge of each. An unprecedented gorge and flood occurred at Mandan during March, 1910, destroying Northern Pacific Railway tracks and several boats at Bismarck.

At the Sioux ice harbor the repairs to barges were completed and fleet launched. During the month of June minor repairs were made to the pile driver and other plant.

The pile driver and one barge at the dike at Pierre, S. Dak., were sunk and wrecked during the spring high water.. Both were practically unserviceable. The steam hammer and some other parts were saved and the wreck sold under proper authority.

APPROPRIATIONS AND ALLOTMENTS.

IMPROVING UPPER MISSOURI RIVER, EXCLUSIVE OF SNAGGING.

Total appropriations and allotments (taken from H. Doc. No. 421, 57th Cong., 2d sess., inclusive of Dec. 31, 1902)	$1,708,926.47
March 3, 1905	75,000.00
March 3, 1907	100,000.00
March 4, 1907, deficiency act (destruction of ice gorge in Missouri River, South Dakota)	5,000.00
Total appropriations and allotments	1,888,926.47
Received from sale of condemned property	1,697.15
Received from refundment	13.20
Received from transfer of materials	5,097.12
Total	1,895,733.94

IMPROVING UPPER MISSOURI RIVER BY SNAGGING.

Total of appropriations and allotments (taken from H. Doc. No. 421, 57th Cong., 2d sess., inclusive of Dec. 31, 1902)	$393,073.53

IMPROVING MISSOURI RIVER FROM MOUTH TO SIOUX CITY, IOWA.

Total of appropriations and allotments (taken from H. Doc. No. 421, 57th Cong., 2d sess., inclusive of Dec. 31, 1902)		$8,739,000.00
February 18, 1904		19.35
April 28, 1904 (allotment)		50,000.00
March 3, 1905		150,000.00
March 2, 1907		300,000.00
March 3, 1905, emergencies allotted April 22, 1908		10,000.00
March 2, 1907, emergencies allotted April 22, 1908		10,000.00
March 3, 1909, emergencies allotted December 13, 1909		20,000.00
Total		9,279,019.35
The total of appropriations and receipts from other sources for the Missouri River from mouth to Sioux City, Iowa, is:		
Act of August 2, 1882, applied to works above Sioux City, Iowa	$4,000.00	
Survey of Missouri River from mouth to Fort Benton, act August 2, 1882	8,844.39	
Act of August 5, 1886, to removing obstructions from Missouri River	1,982.80	
		14,827.19
Funds contributed by railroad companies		50,000.00
Funds contributed by citizens of St. Joseph		50,000.00
Funds contributed by citizens of Hartsburg, Mo		10,000.00
Funds contributed by Sioux City Stock Yards Co		2,000.00
Refunded on account of overpayments, etc		3,578.16
Received from transfer of materials		5,021.59
Received from transfer of surplus property		7,556.15
Received from sale of condemned and surplus property		12,954.32
Received from sale of maps		81.92
Received from deposit by Isthmian Canal Commission		91.86
Received for services of snag boats		394.49
Received for delay to snag boat		100.63
Total		9,435,625.66

IMPROVING MISSOURI RIVER FROM MOUTH TO FORT BENTON, MONT., ACT OF MARCH 3, 1909, PRESERVATION AND MAINTENANCE OF RIVER AND HARBOR WORKS.

For plant and boat yards	$155,000.00
For dikes and revetment	400,000.00
Total	555,000.00
For refund on account of overpayments	.30
Received from sale of unserviceable property	45.00
Received for services of snag boat	50.00
Received for delay to U. S. towboat *Arethusa*	90.26
Total	555,185.56

COMMERCIAL STATISTICS.

UPPER MISSOURI RIVER (SIOUX CITY TO FORT BENTON).

During the calendar year 1909 the number of boats engaged in carrying freight and passengers, exclusive of those doing a strictly ferriage business, was 16. The freight and passengers carried by them was as follows:

	Tons.
Grain	18,268
Live stock	1,250
Lumber, wood, and coal	10,694
Building material and sand	3,166
General merchandise	7,825
Total	41,203

Passengers, 684. Commerce of upper river expressed in mile-tons, 5,419,331.

CONTRACTS IN FORCE.

FOR CONSTRUCTION OF STANDARD REVETMENT.

Name of contractor: R. O. Shobe, Chamois, Mo.
Character of work: Construction of standard revetment.
Price:
500 linear feet, at $8.90 per foot.
20 per cent increase added.
300 feet added under emergency contract.
Date of approval: October 20, 1909.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: May 4, 1910.
Contract extended for reasonable period.
Completed: May 27, 1910.

Name of contractor: A. W. Farney, Kansas City, Mo.
Character of work: Construction of pile dikes.
Price:
1,700 feet 3-row dikes, at $11.75 per foot.
600 feet 2-row dikes, at $6.77 per foot.
950 feet 3-row dikes, at $13.25 per foot.
750 feet 3-row dikes, at $13.25 per foot.
Date of approval: September 24, 1909.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: March 29, 1910.
Contract time extended for reasonable period.
Contract completed: May 7 and May 24, 1910.

Name of contractor: Swift & Rust, St. Louis, Mo.
Character of work: Construction of pile dikes.
Price: 500 feet 3-row pile dikes, at $15.
Date of approval: November 2, 1909.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: May 11, 1910.
Contract time extended for reasonable period.
Contract completed: June 15, 1910.

Name of contractor: Swift & Rust, St. Louis, Mo.
Character of work: Construction of pile dikes.
Price: 250 feet pile dike, at $15 per foot.
Date of approval: November 18, 1909.
Date of beginning: Ten days after notification of approval of contract.
Date of expiration: May 23, 1910.
Contract time extended for reasonable period.
Contract completed: May 6, 1910.

Name of contractor: DeWitt & Shobe, Glasgow, Mo.
Character of work: Construction of pile dikes and standard revetment.
Price:
1,215 feet pile dike, 2-row, at $5.50 per foot.
1,215 linear feet revetment, at $8.90 per linear foot.
Date of approval: April 12, 1910.
Date of beginning: Ten days after notification of approval of contract.
Date of expiration: Contract to be completed within two months after the completion of the work now being done by the Chicago and Alton Railway Company.
Completion: Contract will be completed about August 31, 1910.

Name of contractor: H. W. Kolkmeyer & Co., Jefferson City, Mo.
Character of work: Construction of levee.
Price:
75,000 cubic yards levee, at 13.75 cents per cubic yard.
5,600 cubic yards levee, at 42 cents per square yard.
Date of approval: April 25, 1910.
Date of beginning: Ten days after notification of approval of contract.
Date of expiration: August 5, 1910.

FOR CONSTRUCTION OF PILE DIKES AND REVETMENT.

Name of contractor: R. O. Shobe, Chamois, Mo.
Character of work: Construction of pile dikes and standard revetment.
Price:
  450 feet 3-row pile dike, at $12.75 per foot.
  500 feet 3-row pile dike, at $12.20 per foot.
  200 feet 3-row pile dike, at $12.40 per foot.
  2,000 linear feet standard revetment, at $7.90 per linear foot.
Date of approval: September 17, 1909.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: March 23, 1910.
Contract time extended for a reasonable period.
Contract completed:
  450 feet completed April 12, 1910.
  700 feet completed July 11, 1910.
  Revetment completed April 23, 1910.

Name of contractor: R. O. Shobe, Chamois, Mo.
Character of work: Construction of pile dikes and revetment.
Price:
  930 feet 3-row pile dikes, at $12.75 per foot.
  2,000 feet standard revetment, at $8.25 per foot.
Date of approval: October 7, 1909.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: April 18, 1910.
Contract extended for reasonable period.
Completed:
  Pile dikes completed April 28, 1910.
  Revetment will be completed about July 18, 1910.

Commerce of the Missouri River from mouth to Sioux City, Iowa, during the calendar year 1909.

The following table, giving the amount of freight carried, towed, and rafted, but not including any ferriage, is an approximation to the lower Missouri River trade for 1909:

Class.	Grain and hay.	Live stock.	Lumber, wood, and ties.	Building material, sand, and coal.	General merchandise.	Total.	Mile-tons.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	
Long-trade packets	83	....	20	....	30	133	13,738
Short-trade packets, miscellaneous boats, etc	7,211	2,188	4,466	8,958	1,614	24,437	503,085
Sand steamers and barges	....	....	....	290,263	....	290,263	259,851
Rafts	....	....	6,700	....	....	6,700	168,782
Riprap, willows, and lumber used by private parties for bank protection	....	....	....	19,277	....	19,277	273,200
Total	7,294	2,188	11,186	318,498	1,644	340,810	1,218,656

Passengers carried, 2,371.

The following table gives the total, in tons, for the different classes of trade during the last eight years for the lower Missouri:

Class.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.
Long-trade packets	133	13,620	8,792	....	....	4,677	2,376	7,989
Short-trade packets, etc	24,437	30,104	19,855	34,332	23,468	19,480	51,506	38,051
Sand and wood steamers and barges	290,263	470,002	782,976	471,173	305,373	402,149	678,878	334,164
Rafts	6,700	1,093	13,439	14,368	550	4,459	1,985	12,073
Mattress brush, stone, and dike material for bank-protection work	19,277	26,325	18,801	53,475	14,044	24,235	15,547	18,250
Total	340,810	541,144	843,863	573,348	343,435	455,000	750,291	410,527

Comparative commerce of the lower Missouri River, expressed in mile-tons.

Class.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.
Long-trade packets	13,738	3,461,751	1,721,406	....	....	971,315	494,746	1,435,605
Short-trade packets, etc	503,085	376,413	258,650	1,215,415	307,968	392,568	1,250,966	626,925
Sand and wood steamers and barges	259,851	195,800	299,184	43,236	284,649	441,043	149,994	429,492
Rafts	168,782	21,610	705,310	260,186	50,200	117,810	95,911	570,137
Mattress brush, stone, and dike material for bank-protection work	273,200	341,375	24,051	805,542	117,327	317,920	237,714	164,750
Total	1,218,656	4,396,949	3,008,601	2,324,379	760,144	2,240,656	2,229,331	3,226,909

(B) MISSOURI RIVER, KANSAS CITY TO THE MOUTH.

The river and harbor act of June 25, 1910, made appropriation as follows:

> Improving Missouri River with a view to securing a permanent six-foot channel between Kansas City and the mouth of the river, one million dollars: *Provided*, That the Secretary of War shall appoint a board of three officers to further consider and report upon the most economical and desirable plan of securing such channel, in which report consideration shall be given to the subject of cooperation on the part of local interests in the work of said improvement: *Provided further*, That the report hereby authorized shall be submitted to Congress on or before the opening of its next regular session.

Work under this appropriation will be taken up during the coming year.

IMPROVING MISSOURI RIVER (MOUTH TO KANSAS CITY, MO.)

Estimate of additional funds required.

Amount required for expenditures in fiscal year ending June 30, 1912:	
For works of improvement	$2,000,000
For maintenance of improvement	50,000
	[a] 2,050,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATION.

Act of June 25, 1910	$1,000,000

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Given under subhead (A).
No contracts in force.

(C) KANSAS CITY TO FORT BENTON.

The river and harbor act of June 25, 1910, made appropriation as follows:

> Improving Missouri River: For improvement and maintenance from Kansas City to Fort Benton, three hundred thousand dollars, of which amount one hundred and fifty thousand dollars, or so much thereof as may be necessary, may be expended between Le Beau and Fort Benton.

Work under this appropriation will be taken up during the coming year.

IMPROVING MISSOURI RIVER (KANSAS CITY TO FORT BENTON).

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$75,000
For maintenance of improvement	100,000
	[a] 175,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.	

APPROPRIATION.

Act June 25, 1910	$300,000

COMMERCIAL STATISTICS.

Given under subhead (A).
No contracts in force.

(D) ST. JOSEPH, MO.

The river and harbor act of June 25, 1910, made appropriation as follows:

> Improving Missouri River at St. Joseph, Mo., in accordance with the report submitted in House Document Numbered eight hundred and twenty-four, Sixtieth Congress, first session, seventy-five thousand dollars: *Provided*, That no part of this amount shall be expended until the city of Saint Joseph, or other agency, shall have deposited to the credit of the Secretary of War in some duly recognized United States depository to be designated by him the sum of seventy-five thousand dollars, to be expended by said Secretary of War, together with the amount herein appropriated, in the execution of the plan of improvement recommended in the report herein referred to.

Work under this appropriation will be taken up during the coming year, provided local interests contribute the required amount.

No estimates submitted.

APPROPRIATION.

June 25, 1910	$75,000

COMMERCIAL STATISTICS.

Given under subhead (A).
No contracts in force.

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[a] Exclusive of the balance unexpended July 1, 1910.

(E) ATCHISON, KANS.

The river and harbor act of June 25, 1910, made appropriation as follows:

> Improving Missouri River at Atchison, Kansas, in accordance with the report submitted in House Document Numbered Seven hundred, Sixty-first Congress, second session, ninety thousand dollars: *Provided*, That no part of this amount shall be expended until the city of Atchison, or other agency, shall have deposited to the credit of the Secretary of War in some duly recognized United States depository to be designated by him the sum of ninety thousand dollars, to be expended by said Secretary of War, together with the amount herein appropriated, in the execution of the plan of improvement recommended in the report herein referred to.

Work under this appropriation will be taken up during the coming year, provided local interests contribute the required amount.

APPROPRIATION.

June 25, 1910	$90,000

COMMERCIAL STATISTICS.

Given under subhead (A).

No contracts in force.

ESTABLISHMENT OF HARBOR LINES, KANSAS RIVER, AT KANSAS CITY, KANS.

In connection with the survey above noted, additional surveys were made toward the establishment of harbor lines. This matter has been the subject of serious consideration since the 1903 flood. A special board of engineers made a report in 1904 on the flood conditions and improvement required, which outlined a project for harbor lines 734 feet wide from the mouth to Fifth street and of greater width above Fifth street; bridges to be raised to an elevation corresponding to the regular flood height of the 1903 flood and to have two piers to bed rock; levee walls to be built on the harbor lines to the regulated flood height. Later the Kaw Valley Drainage District was organized under the laws of the State of Kansas for the purpose of procuring the establishment of harbor lines and the construction of levees and removal of obstructions. This district comprises all the flooded land of Kansas City and Argentine, Kans., and has a taxable property of over $60,000,000. The district has voted thirty-year bonds to an amount of $1,750,000 to pay for the necessary improvements over and above those that will be carried on by the General Government. This work is to consist approximately as follows:

87,000 linear feet of levee.
1,000,000 cubic yards of levee embankment.
83,000 linear feet of levee paving.
11,000 linear feet of mattress revetment.
1,800 linear feet of 3-row pile dike.
1,280,000 cubic yards of excavation between harbor lines and down to low water.

A joint resolution of Congress of February 16, 1909, authorized the Secretary of War to establish harbor lines. A map as prepared under the direction of the Kaw Valley Drainage Board, with the harbor lines shown thereon, was submitted during 1909 to the interested parties for suggestions as to approval. The lines as indicated were generally favorable and the map was submitted to the department, with exceptions noted, on October 28, 1909. A preliminary stadia, triangulation, and shore line survey was made October, 1909–January. 1910, establishing points on both banks of the river similar to the marks and lines established at Kansas City, Mo., for the Missouri River in 1903. A harbor-line hearing was held in Kansas City, Mo., January 25, with an adjourned hearing to January 27, 1910, and a report submitted May 20, 1910, with map and description of the harbor line (in 6 sheets; sheets 1 to 5 are maps showing lines; sheet 6 is a description of triangulation and harbor line). The lines were finally approved by the War Department June 24, 1910.

AA 2.

IMPROVING OSAGE RIVER, MISSOURI.

This work was under the general supervision of Assistant Engineer G. C. Haydon during the year, regarding general river improvement, and under the general supervision of Assistant Engineer Fred W. Honens since October 7, 1909, in reference to the lock and dam improvement. Mr. Robert Walker, United States superintendent, was in local charge of the entire river and lock and dam work.

The work on this river consists in the construction of one lock and dam, about 8 miles above the mouth, and open-river improvement by the removal of snags from the channel, felling overhanging trees from the banks of the river, dredging, and the construction of wing dams and training walls to concentrate the flow of water upon the shoals to increase the depth at those places, in accordance with approved project of 1871.

On July 1, 1909, the available cash balance of the current appropriation amounted to $82,529.06.

The river and harbor act of June 25, 1910, appropriated $35,000 for general improvement and completion of lock and dam.

Construction of Lock and Dam No. 1.—During July, 1909, work was suspended on account of high water. Similar delays occurred throughout the year, as follows: November 10 to 24, December 5 to 13, January 12 to 31, March 10 to 31, Apri 7 to 13, May 7 to 31, and June 6 to 18. After each rise the cofferdam was unwatered and much time lost on account of furloughing and reorganizing the force and clearing the sediment from unfinished work. During February, 1910, the work was delayed on account of the extreme cold weather. Active operations on the construction of the 222-foot section of the Chanoine dam began August 1 by the building of a cofferdam, and by October 12 was completed by 664 linear feet put in place. In the meantime 3 centrifugal pumps had been installed and at work, and on October 13, 1909, the cofferdam was unwatered for the first time and the work of excavating the débris of the old weir dam begun.

On November 10, 1909, an inspection was made of the conditions arising from the striking of the old sunken piers Nos. 2 and 3, which were directly in the line of casing for dam. A tentative plan and estimate of an inner cofferdam for removal of the piers first made to the department November 12, but was later changed and the piers cased in with steel and Wakefield sheet piling, and the concrete over the piers for Chanoine dam was reinforced with extra care, steel rods being placed about 1 foot apart, parallel and vertical to the sill.

All sheet piling for the Chanoine dam were driven to elevation mark 76 feet, the old bed of the river being at elevation of approximately 100 feet. All round piling in the foundation are 40 to 50 feet, except over old pier No. 3, where a few short piling were necessarily driven. The piling is capped with 10 by 10 timbers, on top of which are placed three lines of longitudinal 10 by 10 inch timbers. The foundation below the sill was filled to elevation 101.5 with stone, earth, and gravel, except against the upper sheet piling, where the foundation was excavated and concrete placed to elevation 95.5. The concrete for the sill was then put in on lower side to elevation 107.5 feet, and on upper side to elevation 109 feet. The concrete, mixed in proportions 1, 3, and 6, and the surfacing, 1, 2½, and 5, was placed in vertical sections and dovetailed together and reinforced with ⅜ by ⅜ by 3 inch ells (old weir irons) and ⅝-inch twisted steel bars, spaced 1 foot centers, placed crosswise and about 1 foot below surface of concrete. This section of the Chanoine dam and crib, with apron, was completed April 25 and consists of 222 linear feet of concrete work; 225 linear feet of Wakefield sheet piling on upper line of dam; and 225 linear feet (of which 39 linear feet is steel and 186 linear feet double lap wood) sheet piling on lower line or between dam and crib; 225 linear feet of sill; and 225 linear feet of crib and apron work. There has also been placed 54 anchors and 53 wickets and hurters.

Since April 25 the work has consisted of dismantling the old cofferdam, except the round piling, which will be done as the plant can be spared, the construction of 190 linear feet of new cofferdam for the last section of the Chanoine dam, and the care and repair of plant.

Expenditures during the year.

Labor and services	$40,207.20
Material expended	16,136.84
Fuel	1,484.21
Subsistence stores	4,316.82
Total cost for year	62,144.07

Plans, specifications, and estimate for new steel lock gates to be furnished by contract were submitted February 11, 1910, with the request that the cost ($15,000) be allotted from the emergency appropriation act of March 3, 1909. The allotment was approved and bids were advertised March 22 and opened April 25, 1910.

General improvement.—For the general improvement of this river the general project, adopted in 1871, was followed.

On July 1, 1909, the available cash balance of the current appropriation amounted to $14,286.76.

Plant.—The working plant consists of 2 barges, containing office and quarters for men, 1 barge outfitted with boiler, hoisting engine, and necessary tackle, and an interchangeable clam-shell bucket for dredging, and 2 barges for transportation of construction material.

During July, 1909, the dredge was thoroughly overhauled and a new Mundy hoist, with boom-swing gear, was installed.

The plant was put in readiness and cleared August 2, 1909, for Linn Creek, Missouri, 108 miles above the mouth, arriving there August 6, and active operations, working downstream, begun, the plant to be dropped by hand from place to place as the work progressed. Work was suspended December 21, 1909, on account of winter weather, and the plant quartered. Work was again resumed April 1, 1910, and at the close of the year the force is occupied in repairs to wing dams at Round Island shoals, 88 miles above the mouth.

Frequent rises have occurred during the year and the work was interfered with, but at such times the force was occupied in quarrying and storing stone.

The work accomplished was as follows:

Linn Creek shoal.—The old wing and trail dam, 1,900 linear feet repaired and restored to grade, in which was used 445 cubic yards stone, 415 cubic yards of gravel dredged from channel.

Town shoals.—The old wing dam, 200 linear feet repaired and restored to grade, in which was used 60 cubic yards stone, 300 cubic yards of gravel dredged from channel.

Foleys shoals.—Four hundred and thirty-seven cubic yards of gravel dredged from channel.

Big Kinsile shoals.—The old wing and trail dam, 1,705 linear feet repaired and restored to grade, in which was used 400 cubic yards stone, 700 cubic yards gravel dredged from channel.

Little Kinsile shoals.—The old wing dam, 190 linear feet repaired and restored to grade, in which was used 96 cubic yards stone, 600 cubic yards gravel dredged from channel.

Carroll shoals.—The old wing dam, 110 linear feet repaired and restored to grade, in which was used 45 cubic yards stone.

Wide Ford shoals.—About 500 feet above the old dam. A new wing dam, 150 linear feet was built, in which was used 75 cubic yards stone. The old wing dam and training wall, 682 linear feet repaired and restored to grade, in which was used 205 cubic yards stone.

Round Island shoals.—One hundred and forty-seven cubic yards stone quarried and stored.

Similar open river improvement will be carried on the coming year.

Summary of work done.

Wing dams constructed	linear feet	150
Wing dams and training walls repaired	do	4,787
Stone quarried	cubic yards	1,472
Gravel dredged from channel	do	3,938
Snags and obstructions removed from channel		18
Trees felled from river banks		51
Miles of river worked over		20

Expenditures during the year.

Labor and services	$4,065.80
Subsistence stores	694.89
Material expended	255.73
Repair of plant	2,049.16
	7,065.58

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $15,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS AND ALLOTMENTS.

Total of appropriations and allotments (taken from H. Doc. No. 421, 57th Cong., 2d sess., inclusive of Dec. 31, 1902)	$607,000.00
March 3, 1905	80,000.00
Allotted from emergency appropriation, river and harbor act of March 3, 1905	10,000.00
Allotted from appropriation act of June 13, 1902	10,000.00
March 2, 1907	78,000.00
Refundment on account of overpayment	16.08
Received from sale of property	871.95
Act May 27, 1908, sundry civil bill	100,000.00
Act March 3, 1909	10,000.00
Act March 4, 1909, sundry civil bill	60,000.00
Act March 3, 1909, emergencies (allotted Mar. 12, 1909)	15,000.00
Act June 25, 1910	35,000.00
Total	1,005,888.03

CONTRACT IN FORCE.

Name of contractor: Penn Bridge Company, Beaver Falls, Pa.
Character of work: Construction of two pairs steel lock gates.
Price:

1 pair upper gates	$2,615
1 pair lower gates	3,350
	5,965

Date of approval: June 10, 1910.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: September 15, 1910.

COMMERCIAL STATISTICS.

The steamboat traffic on the Osage River was performed principally by the steamers *Scout*, *Ideal*, *Silber*, *Henry Wohlt*, and gasoline boats *Edna Wells* and *Ruth*.

Close approximation to the amount of river trade during 1909.

Class.	Grain and hay.	Live stock.	Lumber and wood.	Railroad ties.	Building material and sand.	General merchandise.	Total.	Mile-tons.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	
Packets	390	123	256	2,891	10,765	520	14,945	172,014
Rafts				10,319			10,319	363,170
Total	390	123	256	13,210	10,765	520	25,264	535,184

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[a] Exclusive of the balance unexpended July 1, 1910.

Comparative statement of the commerce of the river, expressed in tons, from 1909 to 1901.

Shipments.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.
Hay and grain	390	1,227	2,935	2,494	1,092	466	1,498	6,000	4,232
Live stock	123	1,076	455	1,487	141	827	489	153	1,058
Lumber, wood, and ties	13,466	16,768	15,705	11,644	5,983	18,375	24,256	74,385	56,221
Building material and gravel	10,765	10,408	10,780	474	204	14,573	10,639	12,369	8,000
General merchandise, farm machinery, etc	520	1,127	1,726	4,407	1,164	1,430	1,534	2,284	2,738
Barytes	....	....	....	....	94	75	85	3	90
Total	25,264	30,606	31,601	20,506	8,678	35,746	38,501	95,194	72,339

Comparative commerce of the river, expressed in mile-tons, from 1909 to 1901.

Class.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.
Packets	172,014	384,754	318,280	362,006	557,195	294,104	263,018	675,705	277,106
Rafts, etc	363,170	552,160	817,820	457,074	158,000	980,416	970,723	3,334,065	2,425,710
Total	535,184	936,914	1,136,100	819,080	715,195	1,274,520	1,233,741	4,009,770	2,702,816

A A 3.

IMPROVING GASCONADE RIVER, MISSOURI.

This work was in local charge of Assistant Engineer G. C. Haydon, extracts from whose reports are embodied in the following:

For the improvement of this river the general project adopted in 1880 was followed. It contemplated the removal of snags from the channel and felling of overhanging trees from the banks of the river, and construction of wing dams and training walls, with a grade of 2 feet above low water, to concentrate the flow of water upon the shoals to increase the depth at those places, for which $7,500 was allotted. In addition the project of June 16, 1909, approved June 21, 1909, provided for the construction of a 3-row pile dike, 300 feet in length, across Pryors Mill Chute, near the head, 29 miles above the mouth. This dike to be reenforced or filled in with stone dam. Cost, $7,500.

On July 1, 1909, the available cash balance of the current appropriation from the river and harbor act of March 3, 1909, amounted to $14,615.43.

The river and harbor act of June 25, 1910, appropriates $20,000 for continuing improvement and maintenance, and also provides for an examination and survey from Gascondy to Arlington, Mo.

Work had been suspended on account of high water, and only the necessary force retained for care of plant. On July 8 the force was reorganized and active operations begun. The plant, which consisted of 2 barges, containing office and quarters for the men; 1 barge outfitted for snagging, with boiler, hoisting engine and necessary tackle, and an interchangeable pile driver; 1 barge for transportation of construction material and 1 ponton, with all necessary tools, was dropped downstream by hand from place to place as work progressed. Work under the general project was carried on until October 6, on which date the plant was started on tow by hand to Pryors Mill

Chute, where it arrived October 19, stopping three days en route to do necessary snagging.

The stone for the dam at Pryors Mill Chute was procured in the vicinity by hired labor. The force was organized and began quarrying October 19, and continued until close of operations.

The piles, 93 in number, ranging in length from 18 to 35 feet, a total of 2,172 linear feet, were procured by contract, delivered at site of dam, as was also 185 bracing poles 22 feet in length.

A petition was submitted to the Secretary of War by the resident farmers to open the Pryors Mill Chute, so as to make that the main channel. As directed by the department, an informal public hearing was held at the United States boat yard, Gasconade, Mo., December 3, 1909, to which all interested parties were invited, and at which the division engineer was present. The consensus of opinion was developed that the most important object was to conserve navigation. To do this, the work of building the dam as approved was ordered continued by the department.

Work on the dam at Pryors Mill Chute was begun November 29, by excavating for extension of dike into banks. Pile driving began December 13 and was completed January 1, 1910. The pile dike was fully completed January 8, 1910, by bracing put in place. On January 12 the ice in the river broke up and gorged against the pile dike, causing two breaks, one of 70 feet and the other of 30 feet, or a total of 24 piles carried out. Sixteen of these piles were recovered and 8 purchased and replaced in dike. Repairs to the dike were completed January 26. At the time of the gorge the underflow caused scour immediately under the two breaks. Measurements showed this scour to be from 5 to 12 feet deep, requiring about 3,000 cubic yards additional stone to make the dam than would have been necessary had the scour not occurred.

Work was suspended April 30, with the material deposited in such condition as to withstand high water, and up to such height as to deflect the low-water flow around the main channel, thus giving ample water for boats to navigate this section of the river in low water. The unused stone, 200 cubic yards, was stored for use in repairs.

Upon the request of three interested farmers, who furnished the piles and paid for the required labor, approval was granted for the driving of piles for bank protection along their river front, on the left bank, in the vicinity of Pryors Mill Bend. The piles were then braced by the farmers and filled in behind with brush and stone. The work is equally in the interest of navigation by prevention of bank erosion and the consequent change of channel.

Snagging and dike work was suspended May 7 on account of high water and the plant returned to the Gasconade boat yard, arriving May 17.

The following work was accomplished:

***Snagging** (cost, $3,638.78).*

Miles of river worked over	21
Snags and obstructions removed	261
Side jams removed	12
Shore snags removed	16
Trees felled from river bank	253

REPAIRS TO WING DAMS AND TRAINING WALLS.

Upper Hensley shoals (23 miles above mouth).—The wing and trail dam repaired and restored to grade with an extension at end of wing dam to join up with main bank, which has been secured out at end, and to trail dam to carry the channel depth downstream at a cost of $807.07, of which $607.83 was for material stored for use from last season's operations.

	Linear feet.
Old wing and trail dam repairs	1,000
Extension to wing dam	71
Extension to trail dam	131

Lower Hensley shoals (22½ miles above mouth).—The wing dam repaired and restored to grade, including a breach of 35 feet replaced at a cost of $74.85.

	Linear feet.
Old wing dam repaired	130

Lower Deppe's shoal (21½ miles above mouth).—The wing and trail dam repaired and restored to grade at a cost of $181.95.

Catfish shoals (16¾ miles above mouth).—The original dam was constructed from main bank to island. This old dam was repaired and restored to grade with an extension to join up with main bank, which had been scoured out at the end, at cost of $674.23.

	Linear feet.
Old dam repaired	295
Extension to dam	135

Brown Shanty shoals (16½ miles above mouth).—The old wing dam repaired and restored to grade with an extension to carry the channel depth downstream, at a cost of $325.62.

	Linear feet.
Old dam repaired	50
Extension to dam	201

Lower Becker shoals (6 miles above mouth).—A new wing dam was begun at this shoal, but work was suspended on account of high water, and will be completed when flood subsides, at a cost of $279.40.

New wing dam (uncompleted)	linear feet	90
Stone quarried and stored for use	cubic yards	75

Total expenditures for improvement works, superintendence, and travel, $13,844.39.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $10,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS AND ALLOTMENTS.

Total appropriations and allotments (taken from H. Doc. No. 421, 57th Cong., 2d sess., inclusive of Dec. 31, 1902)	$86,500.00
March 3, 1905	15,000.00
March 2, 1907	10,000.00
March 3, 1909	15,000.00
June 25, 1910	20,000.00
Received from sale of condemned property	124.31
Total	146,624.31

COMMERCIAL STATISTICS.

The steamboat traffic on the Gasconade River was carried on principally by the steamers *W. L. Heckmann*, *Henry Wohlt*, and *August Wohlt*.

Passengers carried, 378.

Close approximation to the amount of river trade during the year 1909.

Class.	Grain and hay.	Live stock.	Lumber and wood.	Railroad ties.	Building material.	General merchandise.	Total.	Mile-tons.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	
Packets	2,441	241	1,012	596	575	743	5,608	167,231
Rafts			200	24,123			24,323	726,128
Total	2,441	241	1,212	24,719	575	743	29,931	893,359

Comparative statement of the commerce of the river, expressed in tons, from 1909 to 1901.

Shipments.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.
Grain and hay	2,441	3,081	4,560	4,235	3,764	1,896	196	4,446	2,437
Live stock	241	368	400	539	242	227	15	167	485
Lumber, wood, and railroad ties	25,931	23,985	44,078	21,736	22,814	11,733	10,551	28,305	14,869
Building material	575	502	350	523	82	93	2	9,845	418
General merchandise, farm machinery, etc	743	951	695	751	2,735	842	24	1,617	1,251
Total	29,931	28,887	50,083	27,604	29,837	14,791	10,788	44,380	19,460

Comparative commerce of the river, expressed in mile-tons, during the years 1909 to 1901.

Class.	1909.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.
Packets	167,231	300,987	340,640	159,150	425,285	226,247	9,139	1,231,183	369,223
Rafts	726,128	818,550	2,394,600	405,629	1,172,895	664,680	691,500	2,508,270	1,347,300
Total	893,359	1,119,537	2,735,240	564,779	1,598,180	890,927	700,639	3,739,453	1,716,523

A A 4.

BANK PRESERVATION AT FORT RILEY MILITARY RESERVATION, KANSAS.

The sundry civil act of March 4, 1909, appropriated $25,000 for bank preservation at Fort Riley, Kans., as follows:

> FORT RILEY MILITARY RESERVATION, KANSAS: For the preservation of the bank lines of Republican River in front of the Fort Riley Military Reservation, by revetment and such other work as may be necessary to protect the said reservation from damage by erosion, twenty-five thousand dollars, to be immediately available.

The work was assigned to this office May 8, 1909.

The necessary preliminary examinations were made and a project and estimate for the construction of two 2-row concrete dikes was submitted August 28, 1909, and approved. A survey was made in November, 1908, since which date there has been no material change. The river above the bridge had considerably eroded the left bank, and continued to such an extent that not only was the bridge threatened, but also a portion of the United States military reservation north of it, amounting to about 20 acres.

The normal width of the Republican River is from 400 to 600 feet. The shore length to be protected is about 3,600 feet, and to revet this entire line would cost approximately $20,000. Such work would hold the present left bank, but would not materially assist in regulating the river or placing it in its old position. A drawing showing conditions and location and extent of dikes is herewith. Three photographs are also herewith, showing completed dikes.

It was therefore considered advisable to construct two dikes, one closing the left chute, 800 feet long, extending from the main bank to head of island, the effect of which is not only to close the chute, but cause the sand bar between the island and mainland to fill in to the height of mainland; the other, 400 feet long, to extend from foot of island at an angle to north end of bridge, the effect of which is to deflect the channel flow under the middle spans of the bridge.

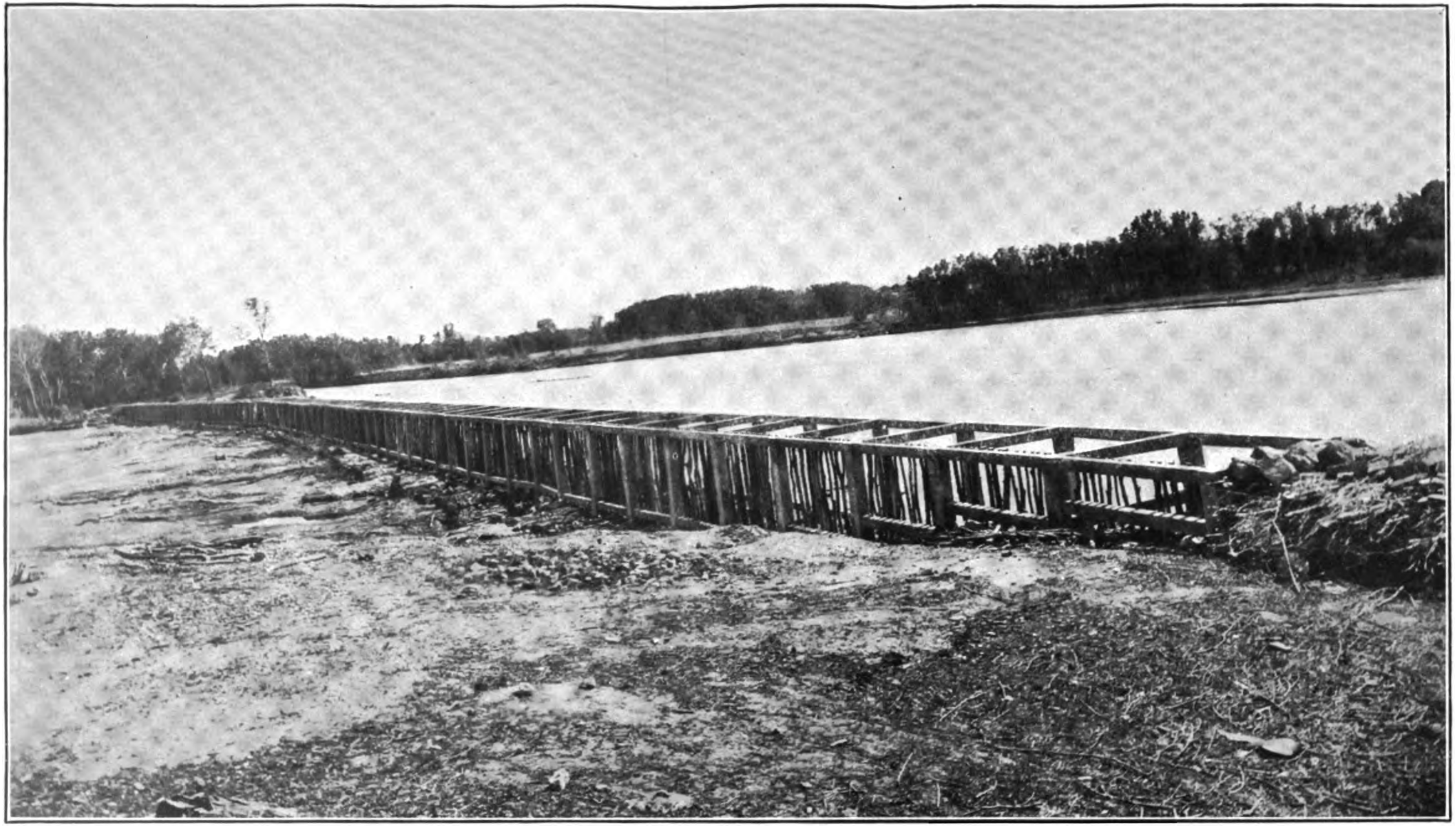
The dike work is similar to that used on the Missouri River, except that 2-row work was used instead of the 3-row, and the width of foot mattress reduced to 40 feet.

The estimate for 1,200 linear feet of 2-row dike of yellow-pine piles and braces, with four buttress stay dikes and foot mattress, is $10,000, or $8.33 per linear foot.

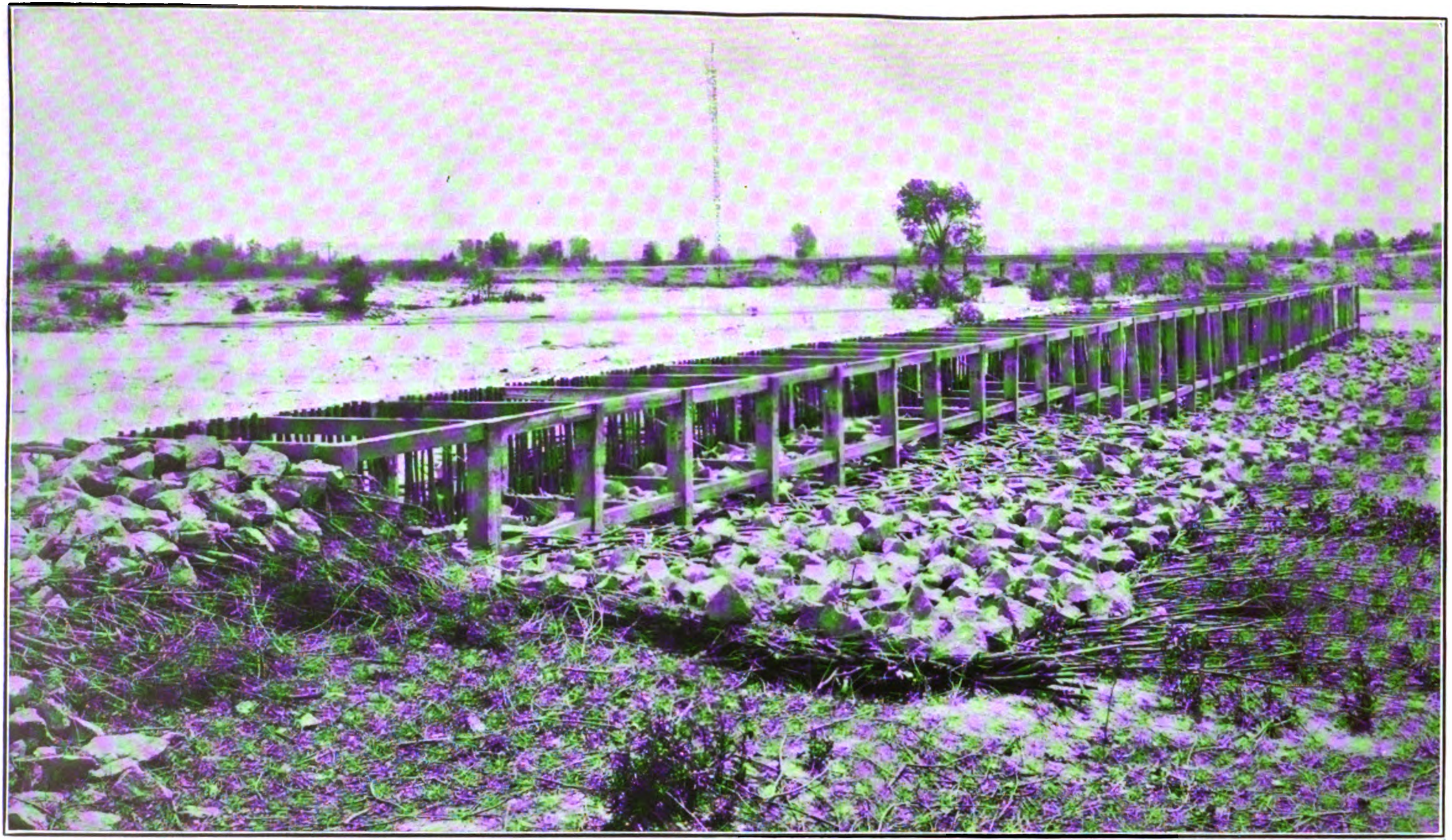
The estimate for 1,200 linear feet of 2-row dike of concrete piles and braces, without stay dikes and foot mattress, was $15,000, or $12.50 per linear foot.

The recommendation for the concrete pile dike was made because of the experience gained from observations of the experimental concrete pile dike built in the Missouri River near St. Joseph, Mo., which demonstrated certain advantages as to durability and strength not belonging to timber dikes, and it is believed the locality at Fort Riley is well suited for such a concrete dike.

Two types of concrete piles were considered—one known as the Chenoweth rolled pile and the other an approximately rectangular



CONCRETE DIKE AT FORT RILEY, KANS. 800 FEET, LOOKING DOWNSTREAM FROM LAND SIDE (FINISHED).



CONCRETE DIKE AT FORT RILEY, KANS. 400 FEET, LOOKING DOWNSTREAM FROM RIVER SIDE (FINISHED).

pile, molded, with steel reenforcement. The rolled pile, made by the American Concrete Company, can be furnished for about $1 per linear foot of pile, but all their machines were in operation and they could not do the work before spring. The rectangular piles cast were adopted, as they can be easily made by hired labor, and the concrete bracing and foot mattress would in either case have to be done by the United States.

A force was organized at Junction City, Kans., October 4, 1909, and yard and forms prepared, pile casting begun October 12 and completed December 1. The concrete is a 1-2-4 mixture, as follows: One part Portland cement, 2 parts Republican River sand, procured by hired labor, and 4 parts native limestone and zinc tailings (Joplin flint). The piles are approximately 11 inches square and approximately 30 feet long, with an 8-inch point, reenforced with 4 steel bars of three-fourths inch diameter, with steel rings ½ inch diameter, spaced 24 inches centers. The braces are 8 by 8 inches, reenforced with 4 steel bars of three-eighths inch diameter. The pile driving was done by contract at a price of 31½ cents per linear foot. Pile driving began December 10, 1909, and was done by a combination hammer and jet. On account of the early winter, work was suspended December 18, 1909, and resumed March 5, 1910, and completed April 21, 1910. The pile driving was not prosecuted to the best advantage owing to isolated locality and lack of suitable appliances.

Piles driven, 243, of the following lengths, exclusive of points:

2 piles, 22 feet 9 inches.
2 piles, 24 feet 9 inches.
239 piles, 28 feet 9 inches.

Total linear feet, 6,966 and 3 inches, at 31½ cents per linear foot; cost, $2,194.37.

The concrete bracings were cast in forms built in place. Work began March 5 and completed April 30, 1910.

The foot mattress for dike was woven in place ahead of the pile driving work. Work began October 18 and completed December 17, 1909. The cost of the mat was unusually high, due to the freight charges and second haul by team to point of location and the erection of scaffolds for weaving across the water.

The screening poles were procured by hired labor on the reservation and were wired into place on the rear concrete bracing.

The work was materially interfered with on account of two bank full rises in November, 1909, not only closing operations but making it necessary to remove material and appliances for storage in a safe place. The first rise of November 13, 1909, carried away 50 cords of brush, which were replaced by brush secured by hired labor on the reservation.

The rise of June, 1910, damaged the upper or 800 feet of dike as follows:

At root a 40-foot break in brush and rock fill, and at foot of dike a 160-foot opening by erosion of island. The dike itself was not injured and the erosion will be corrected by the extension of concrete dike at lower end to cover the gap. At the upper end the brush and rock fill has been repaired.

Summary of work and expenditures.

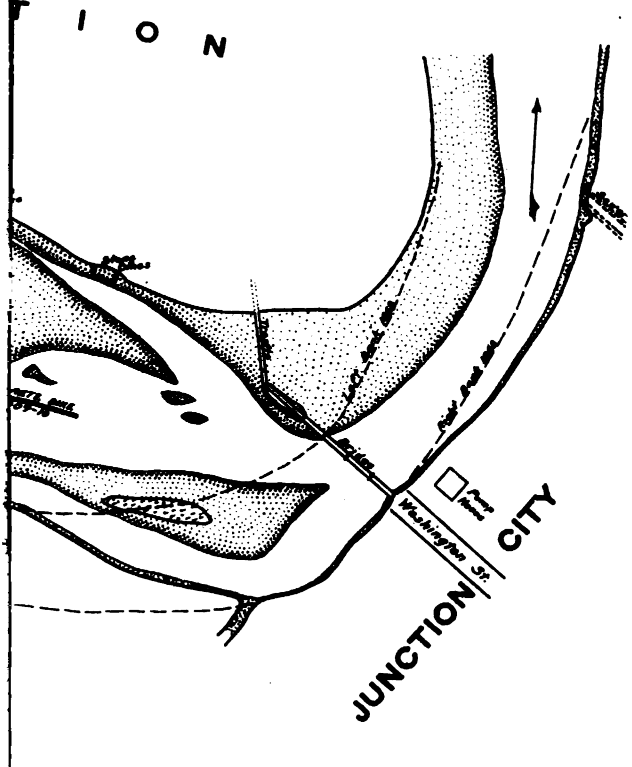
Piles in place, 243, by contract	$2,194.37
Piles cast, 7,270 linear feet	4,421.54
Braces in place, 6,516 linear feet	2,890.05
Dike screened, 1,200 linear feet	255.94
50-foot mattress in place, 1,260 linear feet	3,528.97
8 roots filled with stone and brush	358.10
Total (1,200 linear feet, 2-row concrete dike, at $11.374 per linear foot)	13,648.97

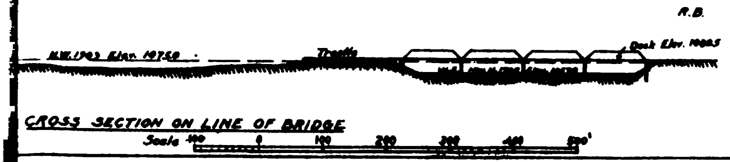
The remaining funds will be utilized in repairing the erosion and for such continuation of work along island as may be necessary.

CONTRACT IN FORCE (EMERGENCY).

Name of contractor: H. A. Kepler, Kansas City, Kans.
Character of work: Driving concrete piles.
Price: 240 concrete piles, at 31½ cents per linear foot.
Date of beginning: October 19, 1909.
Date of expiration: December 19, 1909.
Time limit extended for reasonable period.
Contract completed: April 21, 1910.

CHULZ, CORPS OF ENGINEERS, U.S.A., IN CHARGE





CROSS SECTION ON LINE OF BRIDGE

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216

U.S. ENGINEER OFFICE, KANSAS CITY, MO., JULY 7, 1910.

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

APPENDIX B B.

IMPROVEMENT OF RIVERS AND HARBORS IN THE NASHVILLE, TENNESSEE, DISTRICT.

REPORT OF MAJ. WM. W. HARTS, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. **Obion and Forked Deer rivers, Tennessee.**
2. **Cumberland River, Tennessee and Kentucky.**
3. **Operating and care of locks and dams on Cumberland River, Tennessee.**

ENGINEER OFFICE, UNITED STATES ARMY,
Nashville, Tenn., July 18, 1910.

SIR: I have the honor to transmit herewith the annual report upon the river improvements in my charge relating to the Nashville, Tenn., district for the fiscal year ending June 30, 1910.

Very respectfully,

WM. W. HARTS,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

B B I.

IMPROVEMENT OF OBION AND FORKED DEER RIVERS, TENNESSEE.

(A) OBION RIVER.

No active work was done owing to lack of sufficient funds. The sum of $120.45 was expended during the past fiscal year, which was applied to care of plant.

In view of the cost of the extensive repairs to the floating plant and snagging outfit now found necessary to further carry on this improvement, and in view of the meager benefits resulting from this work in the past, it is not believed that further appropriations under this project are warranted.

About nine-tenths of the commerce consists of timber products floated out at high water, for which the works of improvement are not of much benefit.

APPROPRIATIONS.

July 13, 1892	$7,500.00
August 18, 1894	7,500.00
June 3, 1896	6,000.00
March 3, 1899	2,500.00
June 13, 1902 (allotment dated July 7, 1902)	2,500.00
March 3, 1905 (aloltment dated Apr. 15, 1905)	1,700.00
March 2, 1907 (allotment dated Mar. 27, 1907)	1,700.00
June 25, 1910 (allotment)	218.50
Total	29,618.50

COMMERCIAL STATISTICS FROM JANUARY 1 TO DECEMBER 31, 1909.

Season of navigation, 1909.—Opened March 1; closed June 15.

Vessel classification.

Registered steamers (American)	1
Net registered tonnage	11
Passengers	18

Freight traffic.

Articles.	Amount, in customary unit.	Amount, in short tons.	Valuation.	Average haul for distance freight was carried (miles).
Logs	3,000,000 feet b. m.	6,000	$54,000	[a] 36
Lumber	500,400 feet b. m.	1,112	15,568	
Live stock, large	8 head	4	1,040	24
Other farm products		5	100	
General merchandise		7	1,050	
Total		7,128	71,758	

[a] Rafted.

Rate per ton-mile not obtainable this season.

(B) FORKED DEER RIVER.

No work was done during the past fiscal year, owing to lack of sufficient funds. The sum of $120.45 was expended, which was applied to care of floating plant.

In view of the cost of the extensive repairs to the floating plant and snagging outfit now found necessary to further carry on this improvement, and in view of the meager benefits resulting from this work in the past, it is not believed that further appropriations under this project are warranted.

About nine-tenths of the commerce consists of timber products floated out at high water, for which the works of improvement are not of much benefit.

APPROPRIATIONS.

Old project (pp. 315–316, H. Doc. No. 421, 57th Cong., 2d sess.)		$25,000.00
Present project, by act of—		
June 3, 1896	$1,000.00	
June 3, 1896, for North Fork from Dyersburg to Mississippi River	5,000.00	
March 3, 1899	2,000.00	
June 13, 1902 (allotment, dated July 7, 1902)	2,000.00	
March 3, 1905 (allotment, dated Apr. 15, 1905)	1,300.00	
March 2, 1907 (allotment, dated Mar. 27, 1907)	1,300.00	
June 25, 1910 (allotment)	218.50	
		12,818.50
Total		37,818.50

COMMERCIAL STATISTICS.

Season of navigation, 1909.—Opened February 15; closed July 15.

Vessel classification.

Registered steamers (American)	2
Net registered tonnage	71
Passengers	201

Freight traffic.

Articles.	Amount, in customary unit.	Amount, in short tons.	Valuation.	Average haul for distance freight was carried (miles).
Timber products	1,752,500 feet b. m.	3,505	$31,570	[a] 6
Live stock, large	92 head	46	6,100	29
Live stock, small	75 head	6	600	
Grain	1,815 bushels	51	1,275	
Other farm products		28	2,881	
Miscellaneous		15	634	
General merchandise		30	4,500	
Total		3,681	47,560	

[a] Rafted.

Rate per ton-mile not obtainable this season.

Comparative statement of traffic on Obion and Forked Deer rivers for eight years.

Calendar year.	Tons.	Calendar year.	Tons.
1902	117,415	1906	22,104
1903	22,576	1907	39,305
1904	60,286	1908	24,849
1905	56,285	1909	10,809

BB 2.

IMPROVEMENT OF CUMBERLAND RIVER, TENNESSEE AND KENTUCKY.

(A) BELOW NASHVILLE, TENN. (193 MILES).

During the past fiscal year no active operations were carried on, owing to lack of available plant. The expenditures, viz, $4,773.33, were applied as stated on page 659 et seq., of the current summary.

The new snag boat will commence operations on this section as soon as work on the upper Cumberland is finished, which will be in about sixty days.

At least $5,000 per year should be provided for clearing the channel way of surface obstructions.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$250,000
For maintenance of improvement	2,500
	[a] 252,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Old project (p. 339, H. Doc. No. 421, 57th Cong., 2d sess.):		
Cumberland River, Tennessee and Kentucky (all expended below Nashville)		$155,000.00
Cumberland River below Nashville		305,000.00
New project for locks and dams, acts of—		
July 13, 1892	$40,000.00	
August 18, 1894	30,000.00	
June 3, 1896	80,000.00	
March 3, 1899	100,000.00	
Amended act of June 13, 1902	180.000.00	
March 3, 1905	10,000.00	
March 3, 1909 (maintenance), allotment dated April 1, 1909	10,000.00	
June 25, 1910 (locks and dams)	213,000.00	
June 25, 1910 (maintenance)	10,000.00	
		673,000.00
Total appropriated		1,133,000.00
Received from other sources		1,002.80
Grand total		1,134,002.80

COMMERCIAL STATISTICS.

CUMBERLAND RIVER BELOW NASHVILLE, TENN.

Season of navigation, 1909.—Open at beginning of year; closed July 31; reopened November 26.

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[a] Exclusive of the balance unexpended July 1, 1910.

Vessel classification.

Registered steamers (American)	29
Net registered tonnage	3,668
Passengers	26,296

CUMBERLAND RIVER BELOW NASHVILLE, TENN., FROM JANUARY 1 TO DECEMBER 31, 1909.

[Open river.]

Freight traffic.

Article.	Amount, in customary unit.	Amount, in short tons.	Valuation.
Logs	1,203,885 feet B. M.	2,408	$21,672
Lumber	1,328,121 feet B. M.	2,951	41,314
Railroad ties	1,252,737	125,274	563,833
Other timber products		497	11,750
Tobacco	4,005 hogsheads	3,605	440,750
Grain	695,834 bushels	19,575	489,375
Live stock, large	3,579 head	1,790	218,760
Live stock, small	9,500 head	831	83,100
Other farm products		1,401	97,800
Fertilizers	82 tons	82	2,050
Iron, manufactured		128	4,864
Sand and gravel	10,943 cubic yards	16,414	8,207
Miscellaneous		49	158
General merchandise		18,113	2,740,200
Total		193,118	4,723,833

Average haul for distance freight was carried: Best obtainable information is that the average distance freight is hauled from Nashville is 130 miles (to Canton, Ky.). Nothing more accurate obtainable this season.

Rate per ton-mile not obtainable from transportation companies.

[For commerce passing Lock A, see commercial statistics, "Operating and care," etc.]

Comparative statement of traffic for eight years.

Calendar year.	Tons.	Calendar year.	Tons.
1902	263,531	1906	223,899
1903	297,438	1907	300,810
1904	275,371	1908	259,734
1905	253,430	1909	193,118

(B) ABOVE NASHVILLE, TENN. (357 MILES).

The amount expended under the existing project during the fiscal year ending June 30, 1910, was $273,318.57, the disbursements being distributed as follows:

Locks and Dams Nos. 3, 4, 5, 6, and 7:	
Lock No. 3	$1,918.51
Lock No. 4	55,940.11
Lock No. 5	31,161.20
Lock No. 6	44,202.13
Lock No. 7	46,921.13
	180,143.08
Lock and Dam No. 21	88,200.49
Maintenance	4,975.00
Total	273,318.57

The following is an account of the work done:

Lock No. 4 (44.7 miles above Nashville).—The working force was employed in placing the lock in operation. The contract with W. C. Rodgers, of Hattiesburg, Miss., for lumber for the dam was terminated November 8, 1909. The dam, 454.6 feet long, was built at a total cost of $32,125.21. There were placed in the dam 520,137 feet, board measure, lumber, at $29.54 per thousand feet, board measure (partially paid for in previous fiscal year), at a cost of $4.84 for framing and placing; the cost of nails, boat spikes, and drift bolts was about $1.84 per thousand feet of lumber used. The plates for the crest of the dam were saved from the repairs at Lock A. Stone placed in the dam, 4,363 cubic yards (solid measurement), cost $1.01 per cubic yard, including 6 cents royalty. Stone quarried and placed above the dam for backing, 828 cubic yards (solid measurement), cost $1.60 per cubic yard for quarrying and $1.28 per cubic yard, including 5 cents royalty, for loading, towing, and placing. Heavy riprap quarried and placed on the bank below lock and abutment, 2,434 cubic yards (solid measurement), cost $1.42 per cubic yard, including 5 cents royalty, for quarrying, and 55 cents per cubic yard for placing. Two lock houses were built, at an average cost of $2,687.14 each; a blacksmith shop was built, at a cost of $210; 231 cubic yards of concrete were placed on the terre plein as paving, at a cost of $6.23 per cubic yard.

Lock No. 5 (72 miles above Nashville).—The working force was engaged in completing the dam and putting the lock into operation. There were 10,935 cubic yards of sand and gravel dredged from the site of the dam, 505.85 feet long, at a cost of 14½ cents per cubic yard. The dam was completed at a total cost of $49,085.77, $23,428.35 being expended in the previous fiscal year. There were 705,792 feet, board measure, lumber used in constructing the dam, 483,060 feet, board measure, of which were placed during the past fiscal year, at a cost of $6.24 per thousand feet, board measure, for framing and placing; the drift bolts, nails, spikes, and plates cost about $2.48 per thousand feet, board measure. There were quarried 3,493 cubic yards (solid measurement) of stone for dam filling, at a cost of $1.12½ per cubic yard, including 2½ cents for royalty, and at a cost of 75 cents per cubic yard for loading, towing, and placing in the dam; 775 cubic yards of stone were quarried, loaded, towed, and placed as backing to the dam, at about the same unit cost; 5,000 cubic yards of gravel were dredged and deposited as backing to the dam, at a cost of 14 cents per cubic yard; about 400 cubic yards of stone were prepared for use in constructing lock houses and were placed in the walls, at a cost of $6 per cubic yard for all labor and material; 75 per cent of the masonry of the two lock houses under construction is completed; 1,370 cubic yards (solid measurement) of stone were quarried for riprap, at a cost of $1.25 per cubic yard, including 2½ cents for royalty; a brick foundation was put under the storehouse, at a cost of $174.

Lock No. 6 (89.6 miles above Nashville).—The working force was engaged in work preparatory to putting the lock into operation. The lock gates were erected during July, August, and September, 1909, under contract; the placing of the valves, maneuvering appliances, etc., was completed by hired labor. Fifty feet of cofferdams were built on the lower end of the lock, at a cost of $4.92 per linear foot;

1,000 cubic yards of concrete were used in building the guard wall, at a cost of $7.479 per cubic yard for all labor and material; 464 cubic yards of concrete were placed at the lower end of the abutment to replace a portion of decayed timber crib, at a cost of $5.096 per cubic yard, including all items chargeable to it; 12,250 cubic yards of sand and gravel were dredged from the dam site, at a cost of 12½ cents per cubic yard; 9,350 cubic yards (solid measurement) of stone have been quarried for dam filling, at a cost of $1.06 per cubic yard; 481,135 feet b. m. of lumber for the dam have been delivered under contract with T. H. Johnston & Co., of Birmingham, Ala., at $31.45 per thousand feet.

Lock No. 7 (*107 miles above Nashville*).—The working force has been engaged with work preparatory to putting the lock into operation. The lock gates were erected under contract during September and October, 1909. A cofferdam, 50 feet long, was built at the lower end of the lock, at a cost of $12 per linear foot. The valves, operating mechanism, etc., were erected, at a cost of $1,228.07. A guard wall, containing 947.67 cubic yards of concrete, was built, at a total cost of $7.31 per cubic yard for all labor and material; 485 cubic yards of concrete were used to replace a portion of decayed timber crib below the abutment, at a total cost of $5.40 per cubic yard for all labor and material; 9,450 cubic yards of stripping were taken off the quarry, at a cost of 31 cents per cubic yard; 6,449 cubic yards (solid measurement) of stone were quarried, at a cost of 98½ cents per cubic yard. There were dredged 7,240 cubic yards of sand and gravel from the site of the dam, at a cost of 14 cents per cubic yard. A snag boat was constructed, 90 feet by 24 feet by 3 feet, at a total cost of $3,018.27. A gasoline tender, 75 feet by 15 feet by 2.6 feet, was built, at a total cost of $3,918.51, and minor plant was cared for and minor repairs made. There were received 314,500 feet b. m. of lumber for dam construction, at $30.75 per thousand feet, under contract with T. H. Johnston & Co., of Birmingham, Ala., dated January 15, 1910.

The steamers *Cumberland*, *Henry*, and *John* were engaged during the fiscal year in towing supplies and materials for the entire improvement. The steamer *Cumberland* was sent to Paducah, Ky., in January, 1910, placed on the ways, and repairs made to the hull, at a total cost of $3,286.75.

Lock No. 21 (*294¼ miles above Nashville.*)—This work was formerly under contract. For an account of the annulment, attention is invited to page 1689 of the Report of the Chief of Engineers for 1908. At the close of the fiscal year the status of the principal part of this work was as follows: The lock and guide walls, with the necessary excavation and embankment, are completed; the abutment of the dam is about 95 per cent completed; the work of grading the bank for riprapping is 75 per cent completed; riprap and stone filling for bank protection is 35 per cent completed; the lock master's house is finished, costing about $4,700, and about 80 per cent of the lockman's dwelling is completed; a brick storehouse is about 50 per cent finished; work on the dam has just begun. Taking into consideration the additional work remaining to be done, Lock and Dam No. 21 may be said to be about 65 per cent completed. Weather conditions seriously delayed the work.

The quantities and unit cost of the work during 1910 are given as far as practicable, viz:

	Quantity.	Rate per unit.
Lock, abutment, etc.:		
Earth excavation....cubic yards..	10,616.6	$0.365
Rock excavation....do....	204.4	1.654
Embankment....do....	4,297.8	.592
Concrete....do....	8,907.1	5.828
Riprap....do....	3,245.2	2.299
Stone filling....do....	1,594.2	2.089
Puddling....do....	97.0	1.306
Bolt holes....feet..	123.0	.538
Placing irons....pounds..	17,445.0	.00534
Dam:		
Rock excavation....cubic yards..	51.0	1.850
Concrete....do....	277.0	6.060
Guide wall:		
Earth excavation....do....	361.0	.356
Rock excavation....do....	50.1	2.267
Embankment....do....	1,467.8	.303
Concrete....do....	1,130.0	4.831

The completion of Lock and Dam No. 21 will back the water up beyond the junction of the two forks, which will add about 4 feet additional depth to what is now the ruling low-water stage at Burnside. This will make a harbor at this town very useful for the summer anchorage of boats when the remainder of the river is too low for navigation, beside affording excellent opportunities for the transportation of freight from the Queen and Crescent Railroad which crosses the river at this point.

The new snag boat was sent to Burnside, Ky., the head of navigation, in June, 1910, to begin the season's work of snagging. A working party is now being organized, and operations will be underway shortly after the close of the fiscal year.

An annual appropriation of at least $5,000 should be made for clearing the river above Nashville of surface obstructions in order to assist in maintaining its navigability.

An additional appropriation of $85,000 is recommended to finish the project for the completion of Locks and Dams Nos. 3, 4, 5, 6, and 7.

The estimate for the completion of this work was $550,000, which has already been appropriated (Annual Report of Chief of Engineers, 1905, p. 1730). Of this amount there remains on this date an available balance of about $44,000.

Locks and Dams 3, 4, and 5 have been completed and placed in operation. Locks and Dams Nos. 6 and 7 have been completed with the exception of the dams, the construction of the necessary lock houses, and bank protection. It will also be necessary to do considerable channel excavation between Locks 4 and 7, and to provide for the acquisition of land necessary for a boat yard and ways for the repair of floating plant.

The available balance will be exhausted in the construction of Dams 6 and 7 and the completion of the lock houses at Lock 5, and necessary contingencies.

The estimate for the completion and putting into operation of Locks Nos. 1 to 7, inclusive, was submitted by Lieut. Col. M. B.

Adams, Corps of Engineers, in Report of Chief of Engineers, 1899, pages 2245–2246, and the prices were based on those obtaining at that time. Since that estimate was submitted the price of labor and material has considerably advanced, and during the progress of the work it has been found necessary to largely increase the quantities of bank protection over those estimated for, as the banks washed more rapidly than was anticipated.

The following are the approximate amounts of the items making up the estimate, which also includes contingencies, viz:

Channel excavation	$25,000
Bank protection	20,000
Boat yard and ways	25,000
Four buildings	15,000
Total	85,000

Experience with the locks already in operation indicates that in the course of the next two or three years it will be necessary to raise the lock walls from 3 to 5 feet, except at Lock 5, where nothing will be required. After the completion of Locks 6 and 7 more definite information as to just what will be necessary will be available and the subject will be more fully considered hereafter.

The Cumberland River above Nashville between Locks 7 and 21 is not all worthy of radical improvement by locks and dams for the present, as the attendant expense does not appear to be plainly warranted by the commercial necessities.

Complaint has been made in a petition by citizens of Wilson County, Tenn., of the effect produced at a ford of a county road across Spencers Creek, about a mile above its mouth, by the backwater from Dam No. 3. Investigation shows that this ford was impassable at certain seasons of the year, due to high water for many years before the construction of the dam. Since construction the period when the ford is impassable has been increased. The petition urges construction of a bridge by the United States, but should the same be undertaken the Government should bear only a small part of the expense thereof, as the improvement accruing therefrom would be greatly in excess of the mere restoration of conditions existing prior to the construction of the dam.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$85,000
For maintenance of improvement	2,500
	[a] 87,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Old project (p. 339, H. Doc. 421, 57th Cong., 2d sess.)		$846,000.00
New project for a system of locks and dams from Nashville, Tenn., to head of Smith shoals, mouth of Rockcastle River, Kentucky:		
Act of—		
August 5, 1886	$75,000.00	
August 11, 1888	200,000.00	
September 19, 1890	250,000.00	
July 13, 1892	250,000.00	
August 18, 1894	200,000.00	
June 3, 1896	20,000.00	
June 4, 1897 (sundry civil act)	350,000.00	
July 1, 1898 (sundry civil act)	250,000.00	
March 3, 1899	100,000.00	
Amended act of June 13, 1902	200,000.00	
Act of—		
March 3, 1905	124,000.00	
June 30, 1906 (sundry civil act)	120,000.00	
March 2, 1907	150,000.00	
March 4, 1907 (sundry civil act)	30,000.00	
May 27, 1908 (sundry civil act)	200,000.00	
March 3, 1909 (maintenance), allotment dated April 1, 1909	10,000.00	
March 4, 1909 (sundry civil act)	250,000.00	
June 25, 1910 (maintenance)	10,000.00	
June 25, 1910 (Lock and Dam 21)	85,000.00	
		2,874,000.00
Total appropriated		3,220,000.00
Received from other sources		569.50
Grand total		3,220,569.50

CONTRACTS IN FORCE.

IMPROVING CUMBERLAND RIVER ABOVE NASHVILLE, TENN.

[Formal contracts.]

1. For construction, delivery, and erection of two steel lock gates, filling valves, etc., for Lock No. 21, at $17,900:
   Contractor: Port Huron Shipbuilding Company, of Port Huron, Mich.
   Date of contract: March 9, 1906.
   Date of approval: March 16, 1906.
   Date of beginning work: March, 1906.
   Date of expiration: Forty available working days after completion of masonry necessary for erection.
2. For construction, delivery, and erection of two steel lock gates, filling valves, etc., for each of Locks 3 to 7, at $85,100:
   Contractor: Penn Bridge Company, of Beaver Falls, Pa.
   Date of contract: July 18, 1907.
   Date of approval: July 31, 1907.
   Date of beginning work: July, 1907.
   Date of expiration: October 31, 1909.
   Contract closed and terminated November, 1909.
3. For furnishing and delivering 699,164 feet b. m. yellow pine lumber for Dam 4, at $28.50 per thousand feet b. m.:
   Contractor: W. C. Rodgers, of Hattiesburg, Miss.
   Date of contract: May 12, 1909.
   Date of approval: June 1, 1909.
   Date of beginning work: May, 1909.
   Date of expiration: June 30, 1909. (Time limit waived June 28, 1909.)
   Contract closed and terminated November, 1909.

4. For furnishing and delivering 883,761 feet b. m. yellow pine lumber for Dams Nos. 6 and 7, at $31.45 and $30.75 per thousand feet b. m., respectively:
   Contractor: T. H. Johnston & Co., of Birmingham, Ala.
   Date of contract: January 28, 1910.
   Date of approval: February 17, 1910.
   Date of beginning work: March, 1910.
   Date of expiration: Lock No. 7, March 15, 1910; Lock No. 6, May 1, 1910. (Time limit waived March 9, 1910.)

COMMERCIAL STATISTICS.

CUMBERLAND RIVER ABOVE NASHVILLE, TENN.

Season of navigation, 1909.—Open at beginning of year; closed, July 31; reopened, December 8.

Vessel classification.

Registered steamers (American)	31
Net registered tonnage	3,302
Passengers	21,773

CUMBERLAND RIVER ABOVE NASHVILLE, TENN., FROM JANUARY 1 TO DECEMBER 31, 1909.

[Open river.]

Freight traffic.

Article.	Amount, in customary unit.	Amount, in short tons.	Valuation.
Logs	22,870,333 feet b. m.	45,741	$411,660
Lumber	13,650,883 feet b. m.	30,335	424,690
Railroad ties	90,133	9,013	40,558
Staves	7,042,508	17,609	352,180
Other timber products		3,115	27,447
Tobacco	5,865 hogsheads	5,279	791,850
Grain	216,553 bushels	6,125	153,125
Live stock:			
Large	792 head	396	39,600
Small	28,736 head	2,519	251,900
Other farm products		3,700	288,270
Fertilizers		500	12,500
Iron, manufactured		505	19,190
Sand and gravel	45,500 cubic yards	68,250	34,125
Lime and cement	9,100 barrels	1,365	11,375
Miscellaneous		1,200	3,000
General merchandise		29,422	4,413,300
Total		225,074	7,274,779

Average haul for distance freight was carried: From Nashville up the river the average haul is reported at 190 miles (to Celina, Tenn.); from Burnside, Ky., down, the average haul is 143 miles (to Butlers Landing). Nothing more accurate obtainable this season.

Rate per ton-mile not obtainable from transportation companies.

[For commerce passing Locks 1, 2, 3, 4, and 5 see commercial statistics, "Operating and care," etc.]

Comparative statement of traffic for eight years.

Calendar year.	Tons.	Calendar year.	Tons.
1902	192,270	1906	334,351
1903	304,462	1907	241,571
1904	242,112	1908	246,260
1905	382,807	1909	225,074

B B 3.

OPERATING AND CARE OF LOCKS AND DAMS ON THE CUMBERLAND RIVER.

Besides operating the locks and the ordinary work of caring for the buildings and grounds, the following work was done:

Lock A.—A new gravel roof was put on the shed used for protecting machinery; dredged 1,090 cubic yards of mud and sand from lock chamber and upper approach, at a cost of 9 cents per cubic yard.

Lock No. 1.—Renewed and repaired the chains on the filling valves; 1,306 cubic yards of mud and sand were dredged from lock chamber and upper approach, at a cost of 9½ cents per cubic yard.

Lock No. 2.—Seven hundred and twenty cubic yards of mud and sand were dredged from the lock chamber, at a cost of 9 cents per cubic yard.

Lock No. 3.—The broken lower slope and apron of the dam were replaced with 1,118 cubic yards of concrete, at a total cost of $4.48 per cubic yard; 100 cubic yards of stone were placed on bank below the lock; filled the joints of paving on terre plein with cement mortar, at a total cost of $351.99.

Lock No. 5.—Eleven hundred and seventy cubic yards of stone for bank protection were delivered and placed below the abutment at a cost of 42 cents per cubic yard; 500 cubic yards of mud were removed from the lock chamber, at a cost of 8 cents per cubic yard.

A 10-inch suction hydraulic dredge, 90 feet by 24 feet by 3.5 feet, was built at Muscle Shoals Canal, at a cost of $10,595.47, and is used for removing deposits from locks. The steamer *Cumberland* was repaired, at a total cost of $3,286.75, at the Paducah Marine Ways, Paducah, Ky., one-half the cost being charged to operating and care funds and one-half to lock and dam construction.

ALLOTMENTS.

June 26, 1905	$14,000.00
July 18, 1906	6,014.87
August 13, 1907	28,888.23
August 1, 1908	14,681.23
Septebmer 9, 1908 (pump boat)	9,000.00
August 3, 1909	28,706.07
Received for damages	74.75

Summary of expenditures for operating and care of locks and dams on Cumberland River for fiscal year ending June 30, 1910.

Services	$5, 142. 93
Repairs and dredging	13, 333. 19
Supplies	349. 82
Subsistence	841. 46
Pump boat	10, 595. 47
Office expenses and contingencies	2, 792. 86
Total	33, 055. 73

COMMERCIAL STATISTICS.

Statement of traffic passing locks on Cumberland River during calendar year 1909.

	Lock 1.	Lock 2.	Lock 3.	Lock 4.[a]	Lock 5.[b]	Lock A.
Total lockages ... number	554	1,311	1,044	30	33	561
Craft:						
Packets ... do	257	155	134	3	4	234
Towboats ... do	176	66	40	3	3	90
Government boats ... do	31	56	96	9	5	9
Barges ... do	378	258	140	13	8	256
Sand dredges ... do	99	86	23	3	...	3
Small craft ... do	230	196	74	8	13	188
Rafts ... do	117	750	649	3	5	13
Cargo:						
Logs ... tons	6,797	39,448	42,511	213	99	286
Lumber ... do	595	7,990	5,620	...	...	248
Railroad ties ... do	32,167	31,611	23,617	...	...	62,365
Poles, telegraph and telephone ... do	40	20,834	16,744	...	...	18
Staves ... do	112	1,231	735	...	...	4
Other timber products ... do	391	535	396	...	34	80
Tobacco ... do	202	2,847	3,399	...	...	266
Grain ... do	18,287	2,689	2,673	...	...	22,829
Live stock:						
Large ... do	900	348	291	14	13	951
Small ... do	533	1,975	1,839	36	36	1,364
Other farm products ... do	834	908	680	17	17	1,077
Sand and gravel ... do	15,438	14,597	2,602	...	...	...
Lime and cement ... do	39	490	1,351	...	2	23
Wood ... do	5,612	...	1,112	...	...	...
Coal ... do	66	860	882	...	...	846
Miscellaneous ... do	404	195	58	5	5	131
General merchandise ... do	5,129	12,427	12,662	240	242	6,688
Total	87,546	138,985	117,172	525	448	97,176
Passengers	6,494	9,616	2,632	42	31	7,571

[a] Opened to traffic November 17, 1909.

[b] Opened to traffic October 18, 1909.

APPENDIX C C.

IMPROVEMENT OF RIVERS AND HARBORS IN THE CHATTANOOGA, TENNESSEE, DISTRICT.

REPORT OF MAJ. WM. W. HARTS, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Tennessee River.
2. Operating and care of Muscle Shoals Canal, Tennessee River.
3. French Broad and Little Pigeon rivers, Tennessee.
4. Clinch, Hiwassee, and Holston rivers, Tennessee and Virginia.

ENGINEER OFFICE, UNITED STATES ARMY,
Nashville, Tenn., July 18, 1910.

SIR: I have the honor to transmit herewith the annual report for the Chattanooga district for the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

WM. W. HARTS,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. ARMY.

C C 1.

IMPROVEMENT OF TENNESSEE RIVER.

For the purpose of simplifying the record of appropriations the river has been divided into three sections.

(A) ABOVE CHATTANOOGA (188 MILES).

(*a*) *General improvement.*—Field work in this section of the river during the fiscal year was confined to a single locality.

Little River shoals (*171 miles above Chattanooga*).—At the beginning of the fiscal year work had not been resumed on account of the high stage of the river. Late in July, however, the dredge *Kwasind* was moved to this locality from the Hiwassee River, and in August the plant to be used in dike construction and rock excavation was sent down from Knoxville, a quarry was opened, and the season's operations commenced.

Excavation of the rock reefs in the channel was carried on by drilling and blasting, the dredge removing the broken rock. About 4,839 cubic yards of quarried rock were used in the construction of 2,276 linear feet of contraction works for channel regulation. The field cost of this work averaged $1.07 per cubic yard, or $2.27 per linear foot of dike. The dredge removed in all 37,325 cubic yards of material, mainly hardpan, bowlders, and blasted rock, at an average cost of about 23 cents per cubic yard, not including the cost of drilling and blasting the reefs.

Field work was suspended in January. Repairs were made, mainly at the privately owned marine ways in Knoxville, to about 25 pieces of floating plant; the heaviest item being the repair of the dredge *Kwasind*, which amounted to $1,642.59.

The work of drilling and blasting in the channel was resumed in April, but was discontinued on May 7, owing to lack of funds. The projected improvement at Little River shoals has now been brought nearly to completion, and it is expected to finish the work at an early date.

A small amount of maintenance work was done at Soddy shoals by the Hiwassee River fleet after the close of operations on that stream.

It is believed that the importance of adequately improving and maintaining the navigable capacity of the Tennessee River above Chattanooga is sufficient to warrant a vigorous prosecution of the work by the General Government.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$60,000
For maintenance of improvement	5,000
	[a] 65,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Previous projects:			
Total amount appropriated prior to August 18, 1894 (see H. Doc. No. 421, 57th Cong., 1st sess., p. 350)		$331,000.00	
Less balance expended under new project		2,744.17	
			$328,255.83
Present project:			
Balance remaining from previous appropriations		2,744.17	
August 18, 1894		50,000.00	
June 3, 1896		15,000.00	
March 3, 1899		30,000.00	
June 13, 1902		50,000.00	
March 3, 1905		50,000.00	
March 2, 1907		105,000.00	
January 8, 1909 (allotment from emergency river and harbor act of Mar. 2, 1907)		1,270.46	
March 3, 1909 (allotment dated Apr. 1, 1909)		50,000.00	
June 25, 1910		120,000.00	
		474,014.63	
Received from other sources		155.70	
		474,170.33	
Transferred to Little Tennessee River	$2,000.00		
Less balance returned to appropriation	1,489.91		
		510.09	
			473,660.24
Total			801,916.07

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[a] Exclusive of the balance unexpended July 1, 1910.

(*b*) *Little Tennessee River.*—No work was done in the fiscal year. See page 669 of summary.

APPROPRIATIONS.

Previous project:		
August 2, 1882		$5,000.00
Present project:		
March 3, 1905 (allotment of Feb. 24, 1906)	$1,000.00	
March 2, 1907 (allotment of Mar. 25, 1907)	1,000.00	
	2,000.00	
Transferred to Tennessee River above Chattanooga	1,489.91	
		510.09
Total		5,510.09

COMMERCIAL STATISTICS.

TENNESSEE RIVER ABOVE CHATTANOOGA.

Season of navigation, 1909.—Closed August 28; opened December 8.

Vessel classification.

Registered steamers (American)	18
Net registered tonnage	872
Passengers	11,289

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.[a]	Average rate per ton-mile.[b]
				Miles.	*Cents.*
Grain	460,325 bushels	12,880	$330,790	60	4.0
Hay	138,000 bales	6,900	138,000	40	6.0
Live stock, large	290 head	145	17,400	80	5.0
Live stock, small	2,630 head	330	28,930	50	8.0
Straw	9,300 bales	465	4,650	60	4.0
Other farm products		720	57,600	60	10.0
Logs	18,528,000 feet b. m	55,590	333,540	150	([c])
Lumber	3,082,000 feet b. m	6,780	77,050	50	4.2
Railroad ties	20,000	1,820	9,000	50	4.2
Other timber products		200	1,600	20	10.5
Coal	5,300 tons	5,300	10,600	30	([d])
Fertilizer	160 tons	160	4,000	75	2.0
Flour	5,600 barrels	560	38,000	60	4.2
Iron ore	80,165 long tons	89,785	110,225	25	([d])
Marble	332,000 cubic feet	26,975	404,625	4	
Merchandise		5,310	663,750	40	12.5
Miscellaneous		510	20,400	25	10.0
Sand and gravel	117,000 cubic yards	156,000	70,200	2	([d])
Total		370,430	2,320,360	40	6.0

[a] The figures given are based on conjecture only, no information being obtainable from the steamboat lines.

[b] Steamboat companies take no account of distance in fixing freight charges. The results given in this column are based on the average rates of a single line, divided by the assumed average haul as given in the preceding column, and are therefore merely rough approximations.

[c] Floated down in rafts.

[d] Transported by owner of commodity.

Comparative statement of commerce for the past ten years.

Year.	Amount.	Estimated value.	Year.	Amount.	Estimated value.
	Short tons.			*Short tons.*	
1900	380,697	$3,847,629	1905	486,406	$6,673,582
1901	294,607	2,604,931	1906	475,515	3,443,923
1902	478,268	4,296,822	1907	596,380	3,830,790
1903	552,268	4,483,229	1908	621,500	3,187,620
1904	562,677	4,473,617	1909	370,430	2,320,360

(B) CHATTANOOGA, TENN., TO RIVERTON, ALA. (238 MILES).

1. HALES BAR LOCK AND DAM (33 MILES BELOW CHATTANOOGA).

Up to March 1, 1910, rapid progress had not been made by the contractors for the power company. Since that date, however, the work of construction has been prosecuted with greater energy, and at the close of the fiscal year 500 men were at work, a larger force than has been employed at any time since the commencement of operations.

The quantities of the principal classes of work done by the contractors, together with the percentage of the required total thus far accomplished in each case, are shown in the following table:

Classification.	Work done to June 30, 1909.	Work done in fiscal year 1910.	Total to June 30, 1910.	Stage of completion.
CONCRETE.	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*	*Per cent.*
Core wall	11,000		11,000	100.0
Power house structures	3,222	12,338	15,560	44.5
Lock walls	20,450	28,650	49,100	92.6
Dam		2,650	2,650	3.5
Approach wall and piers	200	630	830	11.7
Total	34,872	44,268	79,140	43.7
EARTH EXCAVATION.				
In lock pit and lower approach	13,000		13,000	86.7
For power house and tailrace	174,824	12,150	186,974	79.6
For dam foundation	2,000	3,670	5,670	20.2
Total	189,824	15,820	205,644	74.0
ROCK EXCAVATION.				
In lock pit and lower approach	17,135		17,135	87.3
For power house and tailrace	19,085	6,000	25,085	42.5
For dam foundation		2,755	2,755	11.0
Total	36,220	8,755	44,975	43.4
EMBANKMENT.				
Around core wall (power house side)	125,600		125,000	83.3
Behind land wall of lock		1,400	1,400	8.6
Total	125,000	1,400	126,400	76.2

In exploring the foundations for the power house and dam a number of leaks developed, apparently due to the presence of water-bearing seams between the different strata of the bed rock. By means of well-digging apparatus 56 5-inch holes were sunk to an average depth of about 37½ feet below the surface of the rock, and wherever a flow of water was encountered the wells were grouted with neat cement, using pneumatic pressure. Four thousand barrels of cement were thus used, and with good results; the leakage being stopped in each case.

The lock gates have been delivered and stored at the site of the work. The masonry of the lock is nearly finished, but the erection of the gates will be deferred several months to allow time for the concrete to become thoroughly hardened.

The entire amount estimated to be necessary for the completion of the government's share of the project has been appropriated by Congress.

APPROPRIATIONS.[a]

March 3, 1905	$10,000.00
June 30, 1906 (sundry civil act)	40,000.00
March 2, 1907	62,970.00
March 3, 1909 (allotment)	15,000.00
June 25, 1910	50,875.00
June 25, 1910 (sundry civil act)	50,875.00
	229,720.00
Receipts from sales of maps	18.29
Total	229,738.29

2. OPEN-CHANNEL WORK.

No dredge having been available for work in this section, operations during the season of 1909 were necessarily confined to dike construction, the object being to obtain whatever increase in depth might be practicable by this means (without causing objectionable velocities) and to regulate the slope and channel flow at the locality selected for improvement; this work to be supplemented later by channel excavation, the method by which the principal gain in depth is to be accomplished.

Burdine bar (*132 miles below Chattanooga*).—This shoal, which extends over a distance of about 8,550 feet, with a least depth of about 13 inches, forms the downstream portion of a practically continuous obstruction 4½ miles long; the upper part being known as Chunn bar and the intermediate part as Whitesburg bar. The average slope is not excessive, but limestone reefs, bowlders, and lumps of cemented gravel obstruct low-water navigation by reducing the channel depths.

At the beginning of the fiscal year the plant to be used in carrying out the projected work at this place had been installed, but only preliminary quarry operations had been practicable, owing to an unusually protracted period of high water, and it was not until July 23 that dam building could be commenced.

Five dikes were constructed, ranging in length from 300 to 800 feet and extending out from the right shore about normal to the current. Their length aggregated 2,960 feet, and the stone used in their construction amounted to 14,100 cubic yards; or 4¾ cubic yards per linear foot of dam.

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[a] An allotment of $6,000, made June 30, 1904, from the appropriation for examinations, surveys, and contingencies of rivers and harbors, was expended in making preliminary examinations between Scott Point and Hales bar, and is not included in the appropriations for this improvement.

The season's work was accomplished at a field cost of $12,293.89, the unit costs per cubic yard of rock of the various operations being as follows:

Quarrying, including preliminary work of stripping, installation of plant, etc	$0.492
Loading on barges at quarry	.170
Towing to site of work	.050
Placing in dams	.160
Total	.872

The quarry operated in connection with this work is at Coffee Bluff, about 1 mile below the railroad incline at Hobbs Island, and the average haul in towing the rock to the site of the work was about 4 miles.

Flint River Towhead (*125 miles below Chattanooga*).—This obstruction is situated in the stretch between Hobbs Island and Guntersville, Ala., a portion of the river specially provided for in recent river and harbor legislation. The least available depth here is 2.6 feet at low water in the chute between the tow-head and the left bank, this channel being the one selected for improvement. The slope is not excessive.

Dredging was commenced at this locality on May 12, 1910, but operations were soon stopped by a rise in the river, and the lack of funds prevented further work before the close of the fiscal year. In the six days of actual work the dredge removed 10,700 cubic yards of loose gravel and mud. It is expected to resume dredging at this place as soon as the funds provided by the recent river and harbor act become available.

Floating plant.—A 2-yard dipper dredge, which has been named the *Tennessee*, was provided for this section of the river. Its design follows closely that of the dredge *Kentucky* (employed on the lower Tennessee), which has long since demonstrated its suitability for the class of work required on this river. The hull, 34 by 100 feet, was built by hired labor at the government shipyard at Muscle Shoals Canal at a cost of $13,904.61 (including the upper works); the machinery and fittings were procured by contract at a cost of $19,850, and the installation of the machinery and purchase of electric lighting equipment and other accessories amounted to $3,758.42 additional, making the total cost of the complete dredge $37,513.03. Its performance during the trial given it at Flint River towhead was considered satisfactory. Three dump scows and one towing scow were also built at the canal, and a fourth dump scow was brought nearly to completion, these barges being required for use with the new dredge.

The improvement of the Tennessee River between Chattanooga and Riverton, in view of the extensive traffic carried thereon, is believed to be worthy of continuance by the United States under sufficiently liberal appropriations to permit vigorous prosecution of the work.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$95,000
For maintenance of improvement	5,000
	[a] 100,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Previous projects (open-channel work and Muscle shoals improvement):		
Total amount appropriated to December 31, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 357)		$3,764,145.00
March 23, 1903 (allotment from emergency river and harbor act of June 6, 1900)		6,000.00
June 7, 1904 (allotment from emergency appropriation of June 13, 1902)		2,853.40
March 3, 1905	$15,000.00	
Less balance unexpended	1,674.24	
		13,325.76
		3,786,324.16
Received from other sources		935.08
		[b] 3,787,259.24
Present project:		
Balance unexpended under former project	$1,674.24	
March 2, 1907	205,000.00	
March 3, 1909 (allotment dated Apr. 10, 1909)	5,000.00	
June 25, 1910	310,000.00	
	521,674.24	
Received from other sources	43.18	
Total	521,717.42	
Transferred to Colbert Shoals Canal	5,000.00	
		516,717.42
Total		4,303,976.66

3. COLBERT SHOALS CANAL (8 MILES).

CONTRACT WORK.

Contracts for excavation.—At the beginning of the fiscal year the entire upper section of the canal had been completed, and there only remained a comparatively small amount of excavation to be done in the lower section to complete the canal prism.

The excavation of the canal from the lower end of the concrete river wall down to the Riverton lock has been carried on under three contracts with Shippey & Outzen (stations 10–260) and one with W. A. Shippey and the North Alabama Construction Company (stations 260–290), the work extending over a distance of about 5 miles and involving the removal of approximately 2,200,000 cubic yards of earth and hardpan. The first contract, extending from the lift lock to station 110, was completed in 1907; W. A. Shippey and the North

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Expended for the Muscle shoals improvement, $3,191,726.50; for open-channel work, $595,532.74.

Alabama Construction Company completed their portion in August, 1909, and Shippey & Outzen finished their remaining contracts in March, 1910, completing all contracts for excavation.

Summary of work performed.

Contract.	Fiscal year 1910.			Total from commencement of operations.		
	Earth.	Hardpan.	Total.	Earth.	Hardpan.	Total.
	Cu. yds.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Station 10–110	....	....	....	507,239	67,404	574,643
Station 110–210	51,730	35,980	87,710	628,381	252,399	880,780
Station 210–260	39,222	6,960	46,182	399,370	63,302	462,672
Station 260–290 [a]	64,424	....	64,424	286,794	....	286,794
Total	155,376	42,940	198,316	1,821,784	383,105	2,204,889

[a] No classification.

This excavation was performed at an average cost to the United States of 24.1 cents per cubic yard.

Contracts for gates, valves, and operating machinery.—The upper and lower lock gates were contracted for with the Independent Bridge Company, of Pittsburg, Pa., and the work of erection was completed in December, 1909. Emergency contracts were entered into for the gate-operating machinery, sluice valves, and valve-operating machinery. Of this material only the gate-operating machinery had been delivered at the close of the fiscal year.

HIRED-LABOR WORK.

The work of removing and replacing some of the masonry around the gate anchorages, made necessary on account of certain changes adopted in the method of anchoring the gates, was in progess at the beginning of the fiscal year. It was completed in January at a total cost of $2,023.21. Recesses were cut for receiving gate pintles, and the miter sills were trimmed to fit the curve of the gates, at a cost of $264.18. The work of preparing the recesses in the coping of the lock walls for the spars and the gate and valve operating machinery was nearly completed, at a cost of $2,603.76.

A cofferdam was built across the lower end of the lock and the lock chamber unwatered at a cost of $1,016.82. About 5,200 cubic yards of mud were removed from the lock chamber, this work costing $2,737.68. Most of the material was placed behind the lock walls and graded off to the level of the coping. About 700 yards of deposited material were also removed from the canal, just above the upper miter sill.

The minor operations carried on by hired labor included placing angle-bar guides at the culvert openings for holding culvert screens, providing bulkheads for closing the culverts during high water, cleaning out ditches and placing drain pipe for the drainage of the canal berm, removing willows and other growth from the bed and slopes of the canal, installing gate-operating machinery, etc.

The funds provided by the river and harbor act of June 25, 1910, will suffice to complete the canal under the existing project and place it in operation.

APPROPRIATIONS.

COLBERT AND BEE TREE SHOALS.

September 19, 1890	$150,000.00
July 13, 1892	300,000.00
August 14, 1894	245,000.00
March 3, 1899	100,000.00
June 13, 1902	200,000.00
March 3, 1903 (sundry civil act)	350,000.00
March 3, 1905	200,000.00
March 3, 1905 (sundry civil act)	50,000.00
June 30, 1906 (sundry civil act)	100,000.00
March 2, 1907	200,000.00
March 4, 1907 (sundry civil act)	100,000.00
May 27, 1908 (sundry civil act)	$93,000.00
March 4, 1909 (sundry civil act)	120,000.00
June 25, 1910	100,000.00
Transferred from between Chattanooga and Riverton	5,000.00
	2,313,000.00
Received from other sources	9,118.50
Total	2,322,118.50

ABSTRACTS OF CONTRACTS IN FORCE.

LOCK AND DAM AT HALES BAR.

1. *Contract with Baltimore Bridge Company, of Baltimore, Md., for furnishing and erecting the upper lock gates, for $14,400.*—Contract dated March 20, 1907; approved April 19, 1907. Original date of expiration, October 29, 1907; extended for a reasonable period.

2. *Contract with Penn Bridge Company, of Beaver Falls, Pa., for furnishing sill castings and furnishing and erecting the lower lock gates, for $37,428.*—Contract dated August 27, 1908; approved September 17, 1908. Date of expiration, August 21, 1909; extended for a reasonable period.

COLBERT SHOALS CANAL.

1. *Contract with Shippey & Outzen, of Memphis, Tenn., for excavation of canal trunk between stations 110 and 210.*—Contract dated October 12, 1905; approved November 6, 1905. Date of beginning work, February, 1906. Original date of expiration, December 31, 1907; extended for a reasonable period. Approximate total quantity, 856,000 cubic yards; contract unit prices, 17.49 cents for earth, 50 cents for hardpan, $1 for rock. Completed March, 1910.

2. *Contract with Shippey & Outzen, of Memphis, Tenn., for excavation of canal trunk between stations 210 and 260.*—Contract dated March 12, 1906; approved March 17, 1906. Date of beginning work, March 29, 1908; original date of expiration, December 31, 1907; extended for a reasonable period. Approximate total quantity, 460,000 cubic yards; contract unit prices, 17.49 cents for earth, 50 cents for hardpan, $1 for rock. Completed March, 1910.

3. *Contract with W. A. Shippey and the North Alabama Construction Company, of Riverton, Ala., for excavation of canal trunk between stations 260 and 290.*—Contract dated April 7, 1908; approved May 8, 1908. Date of beginning work, June 15, 1908; date of expiration, May 12, 1910. Estimated quantity, 350,000 cubic yards; contract price, 24.90 cents per cubic yard (no classification). Completed August, 1909.

4. *Contract with Independent Bridge Company, of Pittsburg, Pa., for furnishing and erecting upper and lower lock gates, for $32,665.*—Contract dated May 18, 1909, approved June 3, 1909; date of expiration, 200 available working days after June 4, 1909. Completed December, 1909.

5. *Emergency contract with Chas. Hegewald Company, of New Albany, Ind., for furnishing and delivering gate-operating machinery, for $2,999.*—Contract dated January 21, 1910; original date of expiration, February 25, 1910; extended for a reasonable period. Completed June 7, 1910.

6. *Emergency contract with Penn Bridge Company, of Beaver Falls, Pa., for furnishing and delivering four sluice valves, for $11,490.*—Contract dated January 28, 1910; date of expiration, August 12, 1910.

7. *Emergency contract with Chas. Hegewald Company, of New Albany, Ind., for furnishing and delivering four sets of sluice-gate operating machinery, for $4,159.*—Contract dated March 25, 1910; date of expiration, June 30, 1910; extended for a reasonable period.

COMMERCIAL STATISTICS.

TENNESSEE RIVER BETWEEN CHATTANOOGA AND FLORENCE.

Season of navigation, 1909.—Closed September 1; opened December 10.

Vessel classification.

Registered steamers (American)	20
Net registered tonnage	1,801
Passengers	20,103

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.[a]	Average rate per ton-mile.[b]
				Miles.	*Cents.*
Cotton	53,840 bales	13,460	$3,635,200	25	16.0
Cotton seed	208,070 bushels	3,470	86,750	25	10.0
Grain	426,500 bushels	11,915	309,790	125	2.0
Hay	24,100 bales	1,205	24,100	50	4.0
Live stock:					
Large	5,850 head	2,925	366,875	125	4.8
Small	4,140 head	460	73,600	125	4.0
Other farm products		5,615	336,900	60	10.0
Logs	14,490,000 feet b. m	36,225	260,820	40	(c)
Lumber	10,950,000 feet b. m	24,090	306,600	80	2.5
Railroad ties	50,000	4,545	22,500	60	3.3
Other timber products		2,500	27,500	60	4.0
Cement	30,400 barrels	6,080	38,000	15	(d)
Coal and coke	32,745 tons	32,745	74,780	20	
Fertilizer	5,515 tons	5,515	110,300	55	3.6
Flour	64,300 barrels	6,430	353,650	55	4.5
Merchandise		25,055	3,131,875	80	6.2
Miscellaneous		16,515	825,750	25	10.0
Sand and gravel	72,000 cubic yards	90,000	36,000	4	(d)
Total		288,750	10,020,990	40	6.0

[a] Based on conjecture only. The steamboat companies have no definite information to offer in this connection.

[b] The figures given are based on what are understood to be the average rates charged by the principal boat lines, divided by the assumed average haul as given in the preceding column. No approach to accuracy is possible, owing to the numerous complications involved. In most cases the figures would be lower if it were not for the fact that the average haul is much reduced by the large quantities of freight carried only 22 miles by the Nashville, Chattanooga and St. Louis Railroad on transfer boats (without unloading from cars). Length of haul is not considered by the steamboat companies in fixing their rates.

[c] About one-third floated down in rafts.

[d] Transported by owners of commodity.

Comparative statement of commerce for the past ten years.

Year.	Amount.	Estimated value.	Year.	Amount.	Estimated value.
	Tons.			*Tons.*	
1900	229,160	$5,499,779	1905	175,800	$9,475,632
1901	129,160	4,584,322	1906	413,751	10,146,386
1902	137,861	5,567,464	1907	267,929	10,567,000
1903	297,851	7,439,914	1908	202,450	8,115,735
1904	173,406	7,204,682	1909	288,750	10,020,990

(c) BELOW RIVERTON, ALA. (226 MILES).

The dredging plant belonging to this section of the river, consisting of the U. S. dredge *Kentucky*, two dump scows, one fuel barge, and one towing barge, had been taken to McCulloch bar before the commencement of the fiscal year, but no dredging had been practicable on account of a continuance of high-water stages unlooked for at that season of the year. Work was begun on July 6, the U. S. S. *Lookout* serving as dredge tender, assisted for a time by the U. S. S. *W. R. King*.

McCulloch bar (55 miles above Paducah).—The channel at this locality afforded a least depth of about 4 feet at low water, but was narrow, tortuous, and difficult to follow, and steamboats frequently grounded there at times of low water. To provide a straight channel affording the full projected depth and width it was necessary to dredge four cuts, averaging about 1 mile in length, through the gravel bar which formed the obstruction. The dredged material was deposited near the left shore so as to form a series of check dams, four in number and spaced about 1,200 feet apart, extending out toward the channel a sufficient distance to offset the increase in sectional area caused by the excavation. The material removed amounted to 151,000 cubic yards.

The new channel is 160 feet wide, but as it is located about 350 feet from the left-hand bank the pilots occasionally find difficulty in following it closely, and it is accordingly proposed to dredge another cut on the river side of the channel and dump the material in the form of a longitudinal dike that will be exposed at low stages and serve as a guide to passing vessels.

Pentecost Towhead (40 miles above Paducah).—After completing the projected work at McCulloch bar on October 8, the plant was towed to Pentecost bar, the next obstruction in downstream sequence. Here the island known as Pentecost Towhead divides the river into two chutes, that on the left side being used by steamboats. A survey of the locality indicated an available low-water depth of not more than 4 feet, and several turns in the channel contributed to make navigation difficult, especially for boats with heavy tows. The distance between 6-foot contours was found to be about 3,600 feet, and in dredging the new channel four cuts aggregating 160 feet in width were made to a depth of 6 feet below low-water surface. The material removed amounted to 107,560 cubic yards, and in addition many sunken logs were taken out in making the first cut. The new channel is close to the left shore and not difficult to follow.

The improvement was completed on January 6, 1910, after which the plant was returned to Muscle Shoals Canal for winter quarters and annual repairs.

Summary of work performed.

Classification.	Quantity.	Field cost.	Unit cost.
	Cu. yds.		*Cents.*
Loose gravel and soft material excavated	258,660	$13,245.56	5.1

At the close of the fiscal year the work projected for the season of 1910 had not been commenced, owing to the condition of the appropriation.

Livingston Point, Ky.—Report having been received that the effects of erosion were beginning to threaten the safety of the important natural "ice harbor" of Paducah, Ky. (formed by Tennessee Island and the sandy peninsula known as Livingston Point, between the Ohio and Tennessee rivers), an examination of the locality was made late in 1909. The examination showed that the work most urgently needed was the repair and extension of the old revetment at Livingston Point, a work that was completed in 1894 and last repaired in 1898.

An allotment of $7,000 from the emergency appropriation having been authorized, the work was undertaken late in March by hired labor, a careful investigation having shown conclusively that the work could be done thus much more economically than by contract. A fleet consisting of one steamboat, three rock barges, one derrick boat, and one quarter boat, together with a quarry derrick and hoisting engines, was sent from Lock 6, Muscle Shoals Canal. A quarry was opened on the Tennessee River about 27 miles from the mouth, this being the nearest place where suitable rock could be found. All the rock used was loaded on barges at this place, towed to the site of the work, and unloaded with a derrick boat.

The total quantity of material placed in the revetment was 4,824 cubic yards, loose measurement. The cost of the work, including all incidental expenses, amounted to $6,134, or $1.27 per cubic yard; indicating an average saving of at least 50 cents per cubic yard as compared with the probable cost of the work if it had been let by contract to the lowest bidder. The field cost was $1.16 per cubic yard.

All the weak places on both sides of Livingston Point are now well protected, and it is not likely that further trouble will occur for several years, although a more permanent improvement may some day become necessary. Tennessee Island, also, will undoubtedly require bank-protection work sooner or later, but this may be postponed to advantage until existing tendencies can be more accurately determined.

The improvement of the Tennessee River below Riverton by open-channel methods has resulted in securing benefits more than commensurate with the cost, and is unquestionably worthy of continuance by the General Government.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$75,000
For maintenance of improvement	5,000
	[a] 80,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

TENNESSEE RIVER BELOW RIVERTON, ALA.

September 19, 1890	$25,000.00
July 13, 1892	25,000.00
August 18, 1894	125,000.00
March 3, 1899	100,000.00
June 13, 1902	19,000.00
June 7, 1904 (allotment from emergency appropriation, act of June 13, 1902)	3,497.74
March 3, 1905	30,000.00
March 3, 1906 (allotment from emergency appropriation, act of March 3, 1905)	4,700.00
March 2, 1907	40,000.00
March 3, 1909 (allotment dated Apr. 9, 1909)	25,000.00
January 8, 1910 (allotment from emergency appropriation, act of March 3, 1909)	7,000.00
June 25, 1910	150,000.00
	554;197.74
Received from other sources	838.49
Total	555,036.23

COMMERCIAL STATISTICS.

TENNESSEE RIVER, BETWEEN FLORENCE AND PADUCAH.

Season of navigation.—From Hamburg to the mouth (200 miles) navigation was uninterrupted throughout the calendar year 1909. Between Florence and Hamburg navigation was suspended between October 28 and December 9.

Vessel classification.

Registered steamers (American)	22
Net registered tonnage	3,136
Passengers	23,360

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.[a]	Average rate per ton-mile.[b]
				Miles.	*Cents.*
Cotton	11,740 bales	2,935	$880,500	200	2.0
Cotton seed	134,400 bushels	2,240	50,400	200	1.0
Grain	1,046,400 bushels	30,885	960,575	150	1.1
Hay	23,000 bales	1,150	23,000	150	1.6
Live stock:					
Large	3,400 head	1,700	210,250	150	4.0
Small	19,300 head	2,895	347,400	150	4.5
Peanuts	116,870 bags	8,765	1,051,800	150	2.7
Tobacco	1,456 hogsheads	1,020	153,000	100	2.0
Other farm products		650	26,000	150	1.6
Logs	12,845,000 feet b. m	38,635	231,810	40	(c)
Lumber	15,100,000 feet b. m	33,220	407,700	150	1.2
Railroad ties	2,174,500	217,450	978,525	150	(d)
Other timber products		700	1,400	40	
Cement	1,450 barrels	290	2,610	200	1.0
Coal	1,370 tons	1,370	2,740	200	1.0
Fertilizer	1,630 tons	1,630	35,860	150	1.3
Flour	45,200 barrels	4,520	248,600	225	1.3
Merchandise		22,435	3,365,250	200	3.5
Miscellaneous		1,565	31,300	100	2.5
Salt	1,515 tons	1,515	12,120	225	1.0
Total		375,570	9,020,840	150	2.6

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[a] Wholly conjectural, the steamboat lines having no reliable data to offer. The distances hauled on the Ohio and Mississippi rivers have been disregarded.

[b] The tariff ordinarily charged by the principal transportation company has been divided by the conjectured average haul. Length of haul is not considered by boat companies in connection with freight rates. In many instances the figures given would be materially reduced if the distances carried on the Ohio and Mississippi were taken into consideration.

[c] Largely floated down in rafts.

[d] Transported by owners of commodity.

Comparative statement of commerce for the past ten years.

Year.	Amount.	Estimated value.	Year.	Amount.	Estimated value.
	Tons.			*Tons.*	
1900	1,237,009	$6,105,127	1905	663,606	$11,091,978
1901	658,102	6,322,450	1906	766,118	10,930,000
1902	1,056,270	15,370,604	1907	643,077	10,921,250
1903	848,758	8,720,215	1908	552,560	10,636,445
1904	871,380	18,325,005	1909	375,570	9,020,840

CC 2.

OPERATING AND CARE OF MUSCLE SHOALS CANAL, TENNESSEE RIVER.

The canal was operated, and the locks, canal trunk and embankments, railway, buildings and grounds, and floating plant were cared for during the year.

LOCKS.

No radical improvements or changes were found necessary during the fiscal year, and only occasional minor repairs to operating mechanism, valves, and other appurtenances were made. The placing of a new shaft in the upper valve at Lock B necessitated the construction of a cofferdam. A number of castings for use in lock repairs were made in the foundry at Lock 6. The gates and metal work at Locks 1 to 9 were painted during the year, and at intervals it was found necessary, as usual, to clean away accumulations of mud from behind the lock gates.

CANAL TRUNK AND EMBANKMENTS.

The weirs at Bluewater, Second, and Sixmile creeks received necessary repairs, and the Shoal Creek aqueduct was scraped and painted. Several leaks were stopped, of which the most difficult to overcome was a large one that developed under the towpath at Lock 3. The training walls above Lock A were repaired with rock quarried for the purpose.

The bucket-chain dredge *Alabama*, which is used exclusively in the maintenance of depths in the canal pools and entrances, was in commission during the greater part of the year, and for a time was assisted in its work by the dipper dredge *Kentucky*. The silt removed amounted to 123,459 cubic yards from the lower division and 72,523 cubic yards from the upper division, a total of 195,982 cubic yards. The cost of this work, including repairs to plant and all incidental expenses, was $7,065.98, or an average of 3.6 cents per cubic yard. The removal of this material left the canal prism in fair condition throughout its length.

RAILWAY.

The roadbed, which comprises about 16 miles of track, was kept surfaced, "grassed," and repaired. During the year 5,075 new crossties were placed in the track. Extensive repairs were made to the trestle over Shoal Creek. The laborers' coach was rebuilt at the canal shops, one of the locomotives (No. 5) was given a thorough overhauling, and minor repairs were made to other rolling stock. The two locomotives maintained at the canal were operated a total distance of 17,926 miles, at an average cost of 10 cents per engine-mile.

SHOPS.

The shops and boat-building equipment, which include a sawmill, carpenter shop (with planer), machine shop, blacksmith shop, foundry, dry dock, and other facilities, were operated as usual in the construction and repair of plant for the various appropriations for general improvement in the district, as well as in connection with the maintenance of the canal and its appliances. No new equipment was added.

The lumber sawed during the year amounted to 387,792 feet b. m. The items entering into the average cost of the manufactured material were as follows (per 1,000 feet b. m.):

Average cost of logs delivered at mill	$19.75
Average cost of sawing	5.01
Miscellaneous expenses	1.53
Total cost of rough lumber	26.29

The total quantity of lumber planed was 272,949 feet. The average cost of this work was $2.26 per thousand, making a total unit cost of the finished lumber $28.55.

Work in the foundry was carried on practically throughout the year. The number of castings made was 1,056, their aggregate weight amounting to 26,323 pounds. The cost per pound averaged 2.8 cents for labor and material.

The installation of the 20-kilowatt generator purchased toward the close of the preceding fiscal year was finished. This plant furnishes electric power for operating the machinery in the carpenter shop and machine shop and for lighting at night the shops and other buildings. The expense of maintaining it for the year was $187.71.

BUILDINGS AND GROUNDS.

Sundry necessary repairs were made to buildings, grounds, and appurtenances, together with such minor improvements as appeared desirable. The buildings maintained at the canal are 41 in number, exclusive of small outbuildings.

BOAT-BUILDING OPERATIONS.

Two dredge hulls (one for the Cumberland River), three dump scows, one towing scow, and one derrick boat were completed at the canal shipyard during the year, and a fourth dump scow was brought nearly to completion. Under the allotment for operating and care of the canal extensive repairs were made to the dredge *Alabama*, at a cost of $1,281.55, and four minor pieces of floating plant were repaired, at a total cost of $448.39. For other works in the district, the most important operations of this character were rebuilding the steamer *Lookout* (still in progress at the close of the fiscal year), and repairing steamers *McPherson* and *W. R. King*, gasoline tender *White Oak*, dredges *Kentucky* and *Kwasind*, and two barges.

ALLOTMENTS.

November 28, 1890	$40,000.00
July 1, 1891	31,792.04
July 1, 1892	45,232.90
July 1, 1893	60,975.19
July 1, 1894	63,772.63
July 1, 1895	64,793.11
July 1, 1896	62,707.46
July 1, 1897	67,979.55
July 1, 1898	62,868.17
July 1, 1899	59,239.20
July 1, 1900	63,000.00
July 20, 1900 (to cover deficiency)	355.95
November 2, 1900 (to repair dam above Lock A)	4,500.00
July 1, 1901	62,930.65
April 12, 1902 (to repair storm damage)	30,000.00
July 1, 1902	60,529.19
August 7, 1902 (to rebuild hull of dredge)	$8,000.00
November 6, 1902 (to purchase land)	1,200.00
July 1, 1903	61,016.78
May 23, 1904 (to purchase land)	605.00
July 1, 1904	61,920.78
July 1, 1905	47,391.46
July 1, 1906	44,063.92
June 14, 1907 (to cover deficiency)	6,000.00
July 1, 1907	64,192.51
July 1, 1908	45,815.77
June 18, 1909 (to cover deficiency)	2,000.00
July 1, 1909	49,983.72
Total	1,172,865.98

Summary of expenditures for operating and care of Muscle Shoals Canal for the fiscal year ending June 30, 1910.

Office and administration	$3,720.47
Maintenance and operation of locks	6,911.81
Maintenance of canal trunk and embankment	13,339.39
Maintenance and operation of railway	10,537.50
Maintenance of buildings and grounds	7,531.54
Maintenance of floating plant	1,659.16
Miscellaneous expenses	7,721.00
Total	51,420.87

COMMERCIAL STATISTICS.

MUSCLE SHOALS CANAL, ALABAMA.

Freight transported through canal in 1909.

Articles.	Quantity.	Estimated value.	Articles.	Quantity.	Estimated value.
	Tons.			*Tons.*	
Brick	26	$100	Logs	5,460	32,760
Coal	215	430	Lumber	2,302	28,775
Cotton	2,138	534,500	Machinery	115	23,000
Cotton seed	1,599	39,975	Produce	327	26,160
Farm implements	81	16,200	Railroad ties	320	1,600
Fertilizer	1,078	26,950	Tobacco	17	2,720
Flour	155	9,300	Wood	80	160
General merchandise	2,706	405,900			
Grain	734	20,185	Total	17,353	1,168,715

Number of passengers carried, 846.

List of vessels using canal in 1909.

Name.	Tonnage.	Number of trips made.	Total trips of barges.	Total tonnage of barges.
Almande	73	4	4	1,000
Alvieno	14	3	2	100
Chattanooga	390	30	....	....
City of Florence	82	4	....	....
Decatur No. 1	48	32	33	5,550
J. R. Gunn No. 2	61	120	93	11,850
J. T. Reeder	54	35	....	....
Lilley	19	18	18	570
Lucille	7	20	19	840
Pride of Alabama	19	16	15	880
Total	767	282	184	20,790

Number of lockages made, exclusive of those of government craft, 1,304.

Comparative statement of commerce for the past ten years.

Year.	Amount.	Estimated value.	Year.	Amount.	Estimated value.
	Short tons.			*Short tons.*	
1900	14,881	$297,894	1905	17,796	$759,100
1901	11,925	592,634	1906	26,878	1,074,945
1902	7,712	577,505	1907	21,100	1,059,770
1903	10,571	712,150	1908	12,537	1,097,140
1904	10,560	559,002	1909	17,353	1,168,715

C C 3.

IMPROVEMENT OF FRENCH BROAD AND LITTLE PIGEON RIVERS, TENNESSEE.

In August a working party equipped with derrick boat and grapple, barges, and flatboats was sent to Dandridge (46.5 miles from the mouth), at present the actual head of navigation. Preparations for the season's operations having been concluded, the work of channel excavation and repair of existing contraction works was commenced on August 24 at the shoals situated in the vicinity of Fains Island. Moving on downstream, similar operations were carried on at Zimmerman ford, Evans Island, and Saffel, Bryant, and Brabson shoals. Work was finally suspended on December 22, owing to high water and the presence of ice in the river, and the plant was soon after towed to Knoxville for winter quarters. The field cost of the work was $3,085.06, distributed as follows:

Summary of work performed.

Locality.	Gravel and bowlders dug from channel.	Dikes repaired.	Field cost.[a]
	Cu. yds.	*Lin. feet.*	
Fains Island	859	820	$743.65
Evans Island (including Zimmerman ford)	2,205	1,435	1,233.46
Saffel shoals	700	688	564.50
Bryant shoals	615	720	343.70
Brabson shoals	135	200	199.75
Total	4,514	3,863	3,085.06

[a] Including pro rata share of the cost of moving and equipping fleet, field repairs, and incidentals (amounting in all to $812.95).

Substantial advantages were gained at each locality. In some cases the full project depth (permitting a draft of 2½ feet at low water) was secured, while at others the building of contraction works or the removal of reefs by blasting will be necessary to provide fully improved channels.

The importance of this stream as a navigable waterway is believed to be sufficient to justify whatever reasonable expenditures may be necessary for its further improvement and maintenance.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$5,000
For maintenance of improvement	5,000
	[a] 10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS FOR FRENCH BROAD RIVER, NORTH CAROLINA.

August 14, 1876	$10,000.00	March 3, 1881	$5,000.00
June 18, 1878	15,000.00	August 2, 1882	5,000.00
March 3, 1879	5,000.00		
June 14, 1880	3,000.00	Total	43,000.00

APPROPRIATIONS FOR FRENCH BROAD RIVER, TENNESSEE.

June 14, 1880	$10,000.00	March 3, 1905	$2,000.00
March 3, 1881	3,500.00	March 2, 1907	2,000.00
August 2, 1882	5,000.00	March 3, 1909 (allotment, dated Apr. 9, 1909)	5,000.00
July 5, 1884	3,500.00		
August 5, 1886	6,000.00	June 25, 1910	23,000.00
August 11, 1888	10,000.00		
September 19, 1890	10,000.00		127,000.00
July 13, 1892	15,000.00	Receipts from sales	503.01
August 18, 1894	7,000.00		
June 3, 1896	5,000.00	Total	127,503.01
March 3, 1899	5,000.00		
June 13, 1902	15,000.00	Grand total	170,503.01

COMMERCIAL STATISTICS.

FRENCH BROAD RIVER, TENNESSEE.

Vessel classification.

Registered steamers (American)	4
Net registered tonnage	162
Passengers	2,525

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.[a]	Average rate per ton-mile.[b]
				Miles.	*Cents.*
Grain	44,425 bushels	1,200	$31,200	20	7.0
Hay	14,400 bales	720	14,400	30	4.3
Live stock, small	2,400 head	240	38,400	45	10.0
Other farm products		165	6,600	20	10.0
Logs	1,100,000 feet, b. m.	3,300	18,150	45	(c)
Lumber	630,000 feet, b. m	1,385	17,010	30	8.0
Cement	675 barrels	115	1,350	45	4.0
Coal	500 tons	500	1,000	8	20.0
Fertilizer	70 tons	70	1,575	35	5.1
Flour	300 barrels	30	1,650	10	25.0
Marble	84,600 cubic feet	6,875	103,125	4	
Merchandise		580	87,000	40	9.0
Miscellaneous		135	5,400	20	12.5
Total		15,315	326,860	20	9.0

[a] The figures given are based on conjecture only. It was found impracticable to secure any data from the steamboat companies.

[b] Roughly approximate. The assumed average freight rate has been divided by the average haul, as given in the preceding column.

[c] Floated down in rafts.

Comparative statement of commerce for the past ten years.

Year.	Amount.	Estimated value.	Year.	Amount.	Estimated value.
	Short tons.			*Short tons.*	
1900	160,827	$1,225,677	1905	188,700	$1,599,587
1901	103,340	922,032	1906	139,157	976,424
1902	157,819	1,810,772	1907	82,669	567,769
1903	102,076	1,089,453	1908	26,930	397,360
1904	258,847	2,129,246	1909	15,315	326,860

C C 4.

IMPROVEMENT OF CLINCH, HIWASSEE, AND HOLSTON RIVERS, TENNESSEE.

(A) CLINCH RIVER.

No field work was done during the fiscal year.

Rafting is almost the only real use made of the Clinch River as a navigable waterway. The quantities of logs reported as having been rafted down this stream in the calendar year 1909 aggregated 11,800,000 feet b. m., or about 35,400 tons; value estimated at about $212,400. One small steamboat, the *W. T. Gallaher*, makes an occasional trip at high-water stages as far as Harriman, on the Emory River (4½ miles on Clinch River). About 285 tons of grain and produce were thus transported in 1909. Kingston, less than a mile from the Tennessee River, is the terminus of two boat lines, one out of Chattanooga and the other out of Knoxville. Reliable statistics have not been secured as to what proportion of the traffic handled by these lines may properly be credited to the port of Kingston. This, in any event, is more properly Tennessee River commerce, and even if approximately correct figures were at hand it does not appear that such statistics would have direct bearing on the question of improving the Clinch River for navigation, the short stretch between Kingston and the mouth being entirely unobstructed.

It does not appear desirable, therefore, to expend any money upon the improvement of the Clinch River until the time arrives for the adoption of a project providing for adequate depths for year-round navigation (apparently to be obtained only by canalization), and it is accordingly recommended that appropriations for this stream be suspended for the present.

APPROPRIATIONS.

June 14, 1880	$10,000.00
March 3, 1881	3,000.00
August 2, 1882	3,000.00
July 5, 1884	5,000.00
August 5, 1886	5,000.00
August 11, 1888	5,000.00
September 19, 1890	4,000.00
July 13, 1892	4,000.00
August 18, 1894	2,500.00
March 3, 1899	8,500.00
June 13, 1902 (allotment dated July 5, 1902)	3,000.00
March 3, 1905 (allotment, dated Apr. 10, 1905)	$1,500.00
March 2, 1907 (allotment, dated Mar. 25, 1907)	325.43
June 25, 1910 (allotment)	7,000.00
	61,825.43
Receipts from sales	1.10
Total	61,826.53

(B) HIWASSEE RIVER.

At the beginning of the fiscal year dredging was in progress at Rogers shoals. The deepening of the channel at this locality was completed on July 7, and the dredge *Kwasind* was then moved to Russell shoals, where a channel 90 feet wide was excavated to an average depth of 3 feet at low water. In each case the excavated material was deposited in the form of dikes and check dams to contract the cross section of the river. The work was completed on July 20, and in order to avoid the possibility of being caught by low water in the Hiwassee River the dredge was taken to the Tennessee River for work at Little River shoals.

Summary of dredging operations.

Locality.	Material excavated.	Unit cost.
	Cu. yards.	*Cents.*
Rogers shoals	[a] 1,670	31.5
Russell shoals	3,910	14.9
Total	5,580	19.8

[a] Including 200 cubic yards rock excavation.

In August, as soon as the river had subsided to a stage that would permit dike construction, a working party was sent down the river with the steamer *Chilhowee* and suitable floating plant to make such changes as might be found desirable in the contraction works completed during the preceding season and perform any other work of maintenance that appeared necessary.

In undertaking the improvement of the channel between Charleston and the mouth thirteen shoals were originally found to afford a less depth than 2½ feet, and all of these have been improved in the last few years. During the season of 1909 operations were carried on at eight of these localities, viz, Blackbird, Mathews, Rogers, Ackerman, Agency, Russell, Graves, and Bunker Hill shoals. The work done included modifying and extending some of the new dikes, removing useless portions of old ones, clearing excavated channels of loose rock left by the dredge, and removing snags and overhanging trees.

Before the close of the season's work in December a survey of the various shoals was made to ascertain what additional work would be required. At three localities (Blackbird, Mathews, and Graves shoals) it was found that obstructions still existed, and it is proposed to obtain the full projected depth at these shoals during the coming season.

The improvement and maintenance of the Hiwassee River is a work that is believed to be entirely worthy of continuance by the United States.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Previous project:		
Total amount appropriated prior to June 13, 1902 (H. Doc. 421, 57th Cong., 2d sess., p. 316)	$36,500.00	
Less balance expended under new project	72.93	
		$36,427.07
Present project:		
Balance remaining from previous appropriations	72.93	
June 13, 1902 (allotment dated July 5, 1902)	10,000.00	
March 3, 1905 (allotment dated Apr. 10, 1905)	4,500.00	
March 2, 1907 (allotment dated Mar. 25, 1907)	55,282.40	
March 3, 1909 (allotment dated Apr. 9, 1909)	5,000.00	
June 25, 1910 (allotment)	10,000.00	
	84,855.33	
Receipts from sales	8.23	
		84,863.56
Total		121,290.63

COMMERCIAL STATISTICS.

HIWASSEE RIVER, TENNESSEE.

Season of navigation, 1909.—Closed, August; opened, December.

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[a] Exclusive of the balance unexpended July 1, 1910.

Vessel classification.

Registered steamers (American)	1
Net registered tonnage	94
Passengers	200

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Grain	46,500 bushels	1,295	$29,200
Hay	10,000 bales	500	9,250
Live stock:			
Large	65 head	30	3,300
Small	75 head	10	1,200
Other farm products		325	9,750
Railroad ties	2,000	200	900
Other timber products		200	1,400
Cement	200 barrels	40	400
Fertilizer	50 tons	50	1,250
Flour	800 barrels	80	4,400
Merchandise		250	37,500
Miscellaneous		40	1,600
Total		3,020	100,150

The traffic on this stream is between Charleston and the mouth (19 miles). The average haul, disregarding the distance carried on the Tennessee River, is probably about 15 miles. Freight rates are presumably much the same as on the main river—i. e., from about $2 to $7 per ton.

Comparative statement of commerce for the past four years.

Year.	Quantity.	Estimated value.
	Short tons.	
1906	3,563	$139,225
1907	7,040	295,910
1908	6,330	176,160
1909	3,020	100,150

(c) HOLSTON RIVER.

No work was done in the fiscal year, the river having been left in satisfactory condition for rafting purposes by the maintenance work done in 1907.

The use made of the river is slight, and no additional funds for its improvement appear to be required at this time.

APPROPRIATIONS.

June 13, 1902 (allotment dated July 5, 1902)	$5,000.00
March 2, 1907 (allotment dated Mar. 25, 1907)	1,017.17
Total	6,017.17

APPENDIX D D.

IMPROVEMENT OF RIVERS AND HARBORS IN THE FIRST CINCINNATI, OHIO, DISTRICT.

REPORT OF LIEUT. COL. J. G. WARREN, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Ohio River (general improvement).
2. Construction of Lock and Dam No. 37, Ohio River.
3. Operating snag boats on Ohio River.

United States Engineer Office,
Cincinnati, Ohio, July 14, 1910.

Sir: I have the honor to transmit herewith the annual reports of the works under my charge for the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

J. G. Warren,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, U. S. Army.

D D 1.

IMPROVEMENT OF OHIO RIVER.

GENERAL IMPROVEMENT.

Operations on this improvement were in progress during the last fiscal year under the general project that has been in force for many years, as follows:

DIKES AND LOW DAMS IN THE OHIO RIVER—CONSTRUCTION.

Browns Island dam (60.5 miles below Pittsburg).—The old structure, closing back channel, was originally built in 1837–38. Subsequent repairs were made to this dam between that time and 1906. (Reports of Chief of Engineers, 1905, pp. 1786, 1787; 1907, pp. 1653, 1654; 1908, pp. 1729, 1730; and 1909, pp. 1717, 1718.) Work under the contract with the Advance Sand and Construction Company was begun July 1, 1909, and continued during the fiscal year, except as prevented by high water and bad weather. The dam is to be 656 feet in length, exclusive of abutments, 406 feet being on piling and the rest on rock. Two hundred and thirty-one feet of the dam on piling was completed, and the piling and small-stone filling for 175 feet placed. The abutment walls on Ohio and island shores were completed, and 100 feet of the core wall on the island completed.

A part of the paving on the island has been completed, and there are about 300 cubic yards of stone on hand for paving.

Work done and material placed was as follows:

Excavation, ledge rock	cubic yards	32
Excavation, loose rock	do	4,063.35
Drilling anchor bolt holes	linear feet	30
Piles	number	114
Iron tie rods, anchor bolts, and connections	pounds	7,991
Stone filling, 9 to 18 cubic feet each	cubic yards	1,142.5
Stone filling, ¾ to 3 cubic feet each	do	1,455.75
Earth filling	do	183
Concrete	do	1,707.86
Extra cement	barrels	25½

Marietta Island dam (*168.9 miles below Pittsburg*).—This work is described in Reports of the Chief of Engineers, 1905, pages 1787–1790; 1907, page 1654; 1908, page 1730; and 1909, page 1718.

At the beginning of the fiscal year the work remaining to be done under the contract of Knobloch & Shelton, dated October 14, 1907, was the placing of a part of the stone protection at the ends of the dam.

This work was completed on September 4, 1909. The work done and material placed during the fiscal year was as follows:

Excavation	cubic yards	268.51
Earth filling	do	143.49
Iron tie rods, etc	do	36
Stone, 9 to 18 cubic feet each	cubic yards	35.44
Stone, ¾ to 3 cubic feet each	do	1,289.15
Concrete	do	5.8

The total work done and material placed under the contract was as follows:

Excavation	cubic yards	10,366.31
Earth filling	do	223.49
Piles	number	198
Iron tie rods, etc	pounds	13,365
Stone, 9 to 18 cubic feet each	cubic yards	3,530.9
Stone, ¾ to 3 cubic feet each	do	4,247.15
Concrete	do	2,768.88
Extra cement	barrels	30.5

The total cost, including all expenses, was $55,948.86.

Dike at head of Grand Chain (*about 943 miles below Pittsburg*).—This work is described in Reports of Chief of Engineers, 1904, pages 2478–2482; 1907, pages 1654–1655; 1908, page 1730; and 1909, page 1718. This work was under contract with Oscar F. Barrett, of Cincinnati, Ohio, dated October 14, 1907.

During the fiscal year the stone roughly placed during the preceding year was leveled down and the dike shaped up. Five hundred and seventy-four cubic yards of stone 6 to 10 cubic feet in size were added at the outer end of the dike. The work was finished November 3.

The dike as built extends about 1,635 feet from the Illinois shore. The material placed under the contract was as follows:

Stone, ½ to 3 cubic feet each	cubic yards	9,209
Stone, 6 to 10 cubic feet each	do	574

The channel, owing probably to the effect of this dike, shifted during the low-water season of 1909 over near to the Kentucky shore. The new channel was straightened, and afforded a better depth of water than the old channel at similar stages.

Removing rocks at Grand Chain, Ill. (*943 to 948 miles below Pittsburg*).—The cutting away of the sand bar opposite the new dike exposed a rock ledge in the channel which was liable to prove a serious obstruction in the low-water season.

The occurrence of a low-water stage during any year is so uncertain (this locality being affected by rises in the Ohio, Tennessee, and Mississippi rivers) that it was thought best to depend on such plant as might be available on short notice rather than have a well equipped plant on hand waiting for the possible low-water stage.

Accordingly, men equipped with hand drills and dynamite were employed, and barge and derrick boat equipped with a 1-yard Hayward orange peel bucket were hired from Oscar F. Barrett.

The rock proved hard to drill but very brittle and susceptible to surface blasting. From September 16 to October 20 1,920 cubic yards of material, mostly rock, was removed from the channel and placed below the new dike. On October 21 the derrick boat was moved down to the locality of the Arkansas rock, where several boats had struck within a few years. One hundred and fifty-eight cubic yards of hard blue limestone was removed from two projecting points here.

On October 27 the derrick boat was moved down to the vicinity of the Northern rock, at the foot of the chain. A ledge of cemented gravel with large embedded sandstone extending channelward from the general line of rocks was removed; this amounted to 150 cubic yards.

The derrick boat and barge were discharged October 29.

The total amount of material removed was 2,228 cubic yards, at a cost of $3,569.53.

HARBOR LINES.

The established harbor lines over which supervision is exercised are those at Steubenville, Ohio, Wheeling, W. Va., Ironton, and Cincinnati, Ohio.

The usual work was continued during the year in the investigation of encroachments and of permits requested or authorized.

A public hearing was held in the matter of establishment of harbor lines at East Liverpool, Ohio, and maps submitted, which were returned with instructions to mark the lines on the ground with permanent monuments, which was done.

Maps showing the location of the marking posts and witnesses to same of the Cincinnati, Ohio, harbor lines were submitted and returned with instructions to make a new survey, based on a system of triangulations in connection with the monuments already placed, which is being done.

PERMITS.

Applications for special permits require a considerable expenditure of time and labor for the necessary examination in the field and subsequent supervision in order to secure compliance with the harbor-line restrictions, or, where no harbor lines have been established, with the general laws prohibiting encroachments on navigable waterways. The total number of permits granted during the year and pertaining to this district was 22, of which 3 were for bridges, 9 for pipe lines, 1 for overhead cable, 3 for intakes, 2 for coal tipples, 1 for sewer, 1 for buildings, 1 for cofferdam, and 1 for landing stage for barges.

DREDGING.

The work of the U. S. dredge *Ohio* was as follows:

Wills Creek (65 miles below Pittsburg).—At the beginning of the fiscal year the dredge *Ohio* was engaged in dredging off the point of the hard gravel bar on the West Virginia shore, about opposite and a little below the mouth of Wills Creek.

The object of the improvement at this place was to widen and straighten the channel in such manner as to permit boats to hold away from the rock bar on the right of the channel.

The second cut in progress at the close of the last fiscal year was completed. A third cut, 1,480 feet long and 35 feet wide, and a short cut, 600 feet long and 35 feet wide, at the head of the bar were made.

The combined cuts widened and straightened the channel for a distance of about 1,580 feet. The area dredged varied in width from 45 feet to 110 feet, and was excavated to a depth of 5 to 6 feet below low water.

The excavated material was dumped on the Ohio shore above and below the mouth of Wills Creek during the higher stages of river, and when the stage of water was too low to dump at that place the material was scattered in the deep water of the channel above the bar.

Excavation made July 1 to July 26: Hard gravel and bowlders, 17,032 cubic yards; rocks removed, three, 7.1 tons.

Bat and Grape islands.—After completing the work at Wills Creek the dredge *Ohio* was moved to Bat and Grape islands.

The improvements desired at this place were to widen and straighten the channel at the head of Grape Island by dredging off the shoulder of the island bar on left of channel, and at the foot of Grape Island the removal of a portion of the gravel bar abreast the government light on left of channel to permit boats with tows to clear the rocks and the rock bar on the Ohio shore at that place.

Shoulder of the island bar at the head of Grape Island (151.2 miles below Pittsburg).—The work at the head of Grape Island was started on July 30 and was continued until August 12, at which time the stage of river became so low that there was not sufficient water in the crossing at the head of the island to permit the excavated material being scowed away.

One cut 750 feet long, 35 feet wide, and 5.5 feet below low water was made. A part of the excavated material was cast to the side of the cut, and later, on September 15 and 16, at a higher stage of river, was removed.

The excavated material was dumped along the West Virginia shore, about 3,500 feet above the head of Grape Island.

Excavation made July 30 to August 12 and September 15 to September 16: Sand and gravel, 6,704 cubic yards; rocks removed, one, 8.3 tons.

Bar abreast government light on foot of Grape Island (*151.6 miles below Pittsburg*).—The improvement at this place was started by the dredge *Ohio* in July, 1907, but was discontinued at that time on account of high water. The work was resumed by the dredge *Ohio* on August 13 of this season.

The area dredged in 1907 was partly filled in again, which necessitated the same area being redredged. The *Ohio* continued work at this place until September 21, when owing to the low stage of river and the lack of dumping space the dredge was removed. The work was not entirely completed, but the dredging done resulted in a much improved channel.

The channel was widened and straightened for a distance of about 1,680 feet.

Four cuts, each about 38 feet wide and 5 to 6 feet below low water, were made. The length of the cuts were as follows: First cut from point of bar, 1,020 feet; second cut, 1,360 feet; third cut, 1,680 feet; fourth cut at foot of bar, 950 feet.

The excavated material was dumped along the West Virginia shore below the foot of the islands and scattered in deep water of the channel about opposite the same place.

Excavation made August 13 to September 14 and September 17 to September 21: Sand and gravel, 36,569 cubic yards.

Jenny Lind bar (*225.5 miles below Pittsburg*).—From Bat and Grape islands the dredge *Ohio* was moved to Jenny Lind bar. The object of the improvement at this place was to dredge off a portion of Jenny Lind bar, to afford a greater width of channel for towboats to pass Oldtown Towhead.

The work was started by the United States dredges *Ohio* and *Oswego* in the season of 1907. Some work was also done by the United States dredges in the season of 1908, but the length of time spent by the dredges both seasons was of such short duration that very little work was accomplished.

The dredge *Ohio* resumed the work on September 25, 1909. After completing the two cuts at the foot of the bar, previously started by the dredges in the seasons 1907 and 1908, the dredge moved to the head of the bar and made a short cut about 35 feet wide and 800 feet long to straighten up the line of cuts. Two cuts, each about 35 feet wide and extending the full length of the bar, were then made. The channel was widened for a total distance of 2,150 feet, and the combined width of the cuts made varied from 105 feet at the head of the bar to 155 feet at the foot of the bar. The area dredged was excavated to a depth of 5 to 6 feet below low water.

The excavated material was scattered in the deep water of the channel opposite the rock bar along the Ohio shore below Oldtown Towhead and behind the foot of Oldtown Towhead.

Excavation made September 25 to November 3: Sand and gravel, 41,470 cubic yards; rocks removed (11), 24.1 tons; snags removed (4), 11 tons.

Gallipolis ice harbor (269 miles below Pittsburg).—After completing the work at Jenny Lind bar, the dredge was moved to the Gallipolis ice harbor to remove the deposit of mud, drift, and wreckage lodged above the pier and in the harbor below. For the purpose of removing the deposit of mud, drift, and wreckage above the pier the cuts were started about 330 feet above the upstream face of the pier and the line of dredging carried in to about the low-water line along the shore. The area thus dredged was about 330 feet long and about 120 feet wide.

Below the pier the deposit of mud and drift extended over a much larger area. The lodgment of drift and two sand-boat wrecks against the upstream face of the pier prevented the free flow of current between the sections, causing a deposit of mud and drift immediately below the pier and along the public wharf in the harbor below. Directly below the pier the line of dredging was carried in to about the low-water line along the shore. An area about 450 feet long and varying in width from 70 to 120 feet was dredged.

At the request of river interests the work below the pier was extended down along the public wharf for a distance of 720 feet. The cut made varied in width from 40 to 60 feet and ended at about the downstream edge of the paved landing. The whole area dredged above the pier and in the harbor below was excavated to a depth of 7 to 7.5 feet below low water. The excavated material was dumped along the Ohio shore below Chicamauga Creek, and the snags too heavy to float were pulled out on shore at about the same place.

The work was started on November 6 and completed on December 3.

Excavation made November 6 to December 3, 1909: Mud, drift, and wreckage, 18,379 cubic yards; snags removed, 143, 156.3 tons; rocks removed, 1, 2.8 tons.

Straight ripple (283.5 miles below Pittsburg).—After completing the work at Gallipolis ice harbor, the dredge was moved to Straight ripple.

The object of the improvement at Straight ripple is to cut a low-water channel through the gravel reef formed across the channel at the head of the ripple. Reports indicate that not much trouble was experienced at this point until the low-water periods of this last season. Soundings taken during the time of dredging indicate that the reef is from 1 to 2 feet higher than it formerly had been.

One cut, 35 feet wide and about 1,125 feet long, was made through the reef. A second cut, 35 feet wide, was started, but on account of a rise in the river and cold weather the dredge discontinued operations. The area dredged was excavated to a depth of 5 feet below low water.

The material was dumped on the Ohio shore about 2,000 feet above the head of Straight ripple.

Excavation made December 6 to December 15, 1909: Sand and gravel, 6,405 cubic yards; rocks removed, 1, 1.8 tons.

On December 16 the dredging fleet left Straight ripple for winter quarters in the Kentucky River. The progress of travel was slow on account of the heavy floating ice in the river. The fleet reached the mouth of the Kentucky River on December 21, and on December 22 was arranged in landing about a mile above the mouth of the river.

The towboat used as tender for the dredge during the season was discharged on December 22, 1909.

After placing the property and machinery of the dredge in shape for the winter, all members of the dredge crew were discharged, except those necessary for the care of fleet during the winter.

The dredge *Ohio* remained in winter quarters in the Kentucky River, at Carrollton, Ky., until March 15, 1910, and was then moved to Cincinnati, Ohio, for the annual repairs.

The dredge arrived at Cincinnati, Ohio, on March 18, and the repairs were immediately begun. Boiler repairs, including new smokestack, new drum for boiler feed water heater, new insulation for heater and a portion of the steam lines, were made. The main engines, forward spud and capstan engines, aft spud engines and spud hoist machinery, and swinging cylinder were overhauled, worn out parts being replaced and the machinery properly adjusted. Miscellaneous repairs to wooden capstan, boiler feed pump, water lines, siphon lines, swinging throttle, main throttle, forge stack, and heater stacks were also made. The nosing on side of dredge was repaired and the afterguard rebuilt.

The old dipper pole was dismantled and a new dipper pole was built. An extra dipper pole was built and the construction of a new dipper for the dredge was begun. Repairs were made to the dipper, including the replacing of all loose rivets in fastenings, new snout plate, and new teeth.

The hull plating above water line and the crane of the dredge were repainted.

General repairs were made to dump scows *No. 2* and *No. 4*; the sheathing on the bins was renewed, decks and nosing planks repaired, and new planks and battens placed on the doors.

Under date of March 12, 1910, proposals were invited for hire of two towboats as tenders to the U. S. dredges *Ohio* and *Oswego* for season of 1910. Contracts were subsequently entered into with the lowest bidders, H. B. Hulings, of Pittsburg, Pa., and the Flesher Towboat and Barge Line, of Mount Vernon, Ind.

The work of replating the hull of the dredge *Oswego*, under contract dated May 4, 1909, with Ed. J. Howard, of Jeffersonville, Ind., was completed, and the dredge delivered to the United States at Louisville, Ky., on November 13, 1909.

Under date of November 9, 1909, proposals were invited for hire of towboat as tender for the U. S. dredge *Oswego* during the remainder of the season. No proposal having been received under this notice, a contract was entered into with E. J. Hulings, of Pittsburg, Pa., on December 1, 1909.

On December 1 the plant was moved to Brookport, Ill., where spuds and crane were placed on the dredge; the plant was then taken to Little Chain, but on account of high water no work could be done.

The plant was then moved from Little Chain to Paducah, Ky., and was laid up in the mouth of Tennessee River for the winter on December 14, 1909, and the towboat discharged.

On December 18 the work of arranging the dredging plant in winter quarters was finished and the crew discharged, with the exception of two men needed to care for the plant during the winter.

The dredge remained in winter quarters until February 28, 1910; it was then moved to Cincinnati, Ohio, for annual repairs, arriving at Cincinnati on March 12.

The cabin of the dredge was repainted, and repairs made to ash well, forge and heater stacks, and wooden capstan. The steam lines were overhauled, the pipe being replaced where necessary, and the insulation on the lines and boiler feed water heater repaired. New nosing was placed on the boiler deck of the dredge.

Under contract with the Kanawha Dock Company, of Point Pleasant, W. Va., dump scows *No. 1* and *No. 3* were repaired. The sides, rakes, and bottoms of the scows were recalked, a portion of the rake planks replaced with new timber, and the broken planks in sides and ends of the bins replaced. New sheathing was placed on the rakes and the bins of the scows.

On May 10 the repairs to the dredges *Ohio* and *Oswego* were completed, and they were then started up the river to commence the season's work at Bakers Island. The dredge *Ohio* arrived at Bakers Island on May 20 and the *Oswego* on May 21.

Bakers Island (49 miles below Pittsburg).—The improvement of the channel on the right of Bakers Island was started in the season of 1907, and additional work was done at that place in 1908. Low water interrupted the dredging both seasons before the desired improvement was completed.

In response to urgent requests from towboat interests for further improvement of the channel at Bakers Island, the dredges *Ohio* and *Oswego* took up the work again this season.

On the lower stages of the river, boats with tows have found great difficulty in running the channel, which follows a deep bend past the island and is confined to a narrow width by the high island bar on the left, extending from the head of the island to the foot, and on the right by the creek bar near the head of the island and a shore bar about opposite the foot of the island.

The plan of improvement was to straighten and widen the channel by dredging off the entire creek bar on the right, a portion of the shore bar at the foot of the island, and a portion of the high island bar on the left, extending to the foot of the island.

During the seasons of 1907 and 1908 the creek bar on the right was removed, and a portion of the island bar extending down to about the middle of the island was dredged off. This season the dredging has been confined to the work on the island bar.

The cuts made in the season of 1908 were extended on downstream to the foot of the bar, and in addition two cuts extending for the full length of the bar were made. The dredging done extended over an area 4,080 feet long, widening the channel 70 feet at the head of the bar, about 150 feet at the middle of the bar, and 70 feet at the foot. The area dredged was excavated to a depth of 4 to 5 feet below low water.

The excavated material was distributed along the West Virginia shore above the head of Bakers Island, and along the foot of the island and West Virginia shore below. During low stages a small amount of the excavated material was placed in close along the Ohio shore above Yellow Creek.

Excavation made, May 21 to June 30, 1910:

Sand and gravel	cubic yards	75,054
Rocks removed (1)	tons	3.0
Snags (2)	do	1.5

At the end of the fiscal year work was in progress at this place.

Summary of expenditures for U. S. dredge Ohio.

General supplies and expenses	$915.06
Towing and fuel	11,080.27
Repairs	1,647.57
Salaries	9,029.30
Total	22,672.20

The total excavation by the U. S. dredge *Ohio* during the fiscal year was 166,923 cubic yards of sand, gravel, mud, drift, and wreckage, 47.1 tons of rock, and 167.3 tons of snags, and the cost per cubic yard for excavating sand, gravel, mud, drift, and wreckage was 13 cents, inclusive of all expenditures and outstanding liabilities, and for removing rocks and snags, $4.01 per ton.

The dredge *Ohio* was in commission two hundred and twenty-seven days, and the effective working time was one hundred and thirty-one days; the time lost, ninety-six days, being accounted for by traveling, bad weather, repairs, Sundays and holidays, etc.

Summary of expenditures for U. S. dredge Oswego.

General supplies and expenses	$708.45
Towing and fuel	4,367.15
Repairs	1,566.33
Salaries	5,231.21
Replating	[a] 5,893.82
Total	17,766.96

The total excavation by the U. S. dredge *Oswego* during the fiscal year was 34,790 cubic yards of sand and gravel; snags removed (2), 1.5 tons. The cost per cubic yard of sand and gravel excavated, including all expenditures (except as noted) and outstanding liabilities, was 33.8 cents, and for removing rock and snags, $14.58 per ton.

The dredge *Oswego* was in commission sixty-six days, and the effective working time was twenty-three days; the time lost, forty-three days, being accounted for by traveling, bad weather, repairs, Sundays and holidays, etc.

HYDRAULIC DREDGE INDIANA.

Bonanza bar (353 miles below Pittsburg).—A succession of rises kept the river too high for operations until July 13, when the dredge began work on the upper sand reef above the dike.

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[a] The cost of replating the dredge *Oswego* after twenty-six years' service, $5,893.82, is omitted from the cost of excavation, as it was not considered a proper charge for this one year.

One cut, 1,422 feet long, 60 feet wide, and 4 to 5 feet below low water, was made through the shoal, the excavated material, heavy sand, being discharged on the bar 250 feet to 300 feet to the right of the channel. When this cut was finished the river had fallen so much that it was not considered safe to remain for the ten days longer that would have been required to cut through the lower bar, and the dredge was therefore moved down the river to be ready for the work planned for it below Cincinnati.

Excavation made, July 13 to 23: Sand, 11,627 cubic yards.

Grassy flats (*581 miles below Pittsburg*).—Work at this point was for the purpose of widening the low-water channel dredged out along the Indiana shore in 1905 and extending it farther downstream. The channel was made from 30 feet to 50 feet wider for 450 feet at the lower end, and extended 370 feet to deeper water, most of the extension being 110 feet wide, and all the dredging 5 feet below low water. The excavated material was discharged along the Indiana shore, about 250 feet to the right of the channel. The character of this bar, very hard gravel, with bowlders some of which were too large to pass through the pump, made the rate of excavation very slow. The cutter was always able to loosen the material, but there was considerable delay for removal of large stones from the cutter, pump, and suction pipe; and also, finally, for renewal of the pump linings, which were worn out.

Excavation made August 2 to 13: Hard gravel and bowlders, 6,826 cubic yards; 1 snag, 1 ton.

Hughes bar (*610.5 miles below Pittsburg*).—The dredge stopped to make a cut at this bar, the first below Louisville of the more troublesome sand reefs, but was almost immediately stopped by a rise of the river. As the rise was altogether from headwaters, with the probability that it would not greatly affect the lower river, the dredge was sent on downstream to take up the work that had been planned for it below.

Excavation made: Sand, 80 cubic yards.

Tradewater bar (*861.8 miles below Pittsburg*).—The improvement of the channel through this shoal, one of the most troublesome on the lower river, was begun at once on arrival of the dredge, although the river was so high that accurate location of the work by sounding was very difficult. The channel was found to be much better than for a number of years past, for, although there was still scant water, the sand reef extending down from the long dike on the right opposite Caseyville came in at the lower end of the towhead, instead of at its head or above; the best depth of water being in the direct course to the right of the towhead, whereas the channel heretofore has made a sharp turn to the left at the mouth of Tradewater River, passing between the towhead and the Kentucky shore, a narrow and tortuous course.

A cut 2,272 feet long, 80 feet wide, and 4 feet below low water was made straight down through the reef to assist the improved conditions, the excavated material being discharged on the reef 400 feet to 600 feet to the right, forming a bank parallel to the cut, which materially assisted the improvement by confining the current to the new channel. This channel, widened by the current, maintained its depth and was used by boats and tows during the remainder of the season.

Several wrecks of coal boats and flats, and a number of snags, were cut through and removed by the dredge.

Excavation made, August 24 to September 16: Light sand, with some gravel, 40,519 cubic yards; wrecks removed (coal boat and flat), 2; snags (3), 15.4 tons.

Walkers bar, head of Hurricane Island (*873.5 miles below Pittsburg*).—On completion of the work at Tradewater the dredge proceeded to this place, where the shoal water and crooked channel were causing much delay and trouble to navigation.

One cut was made 1,080 feet long, 80 feet wide, and 4 feet below low water, adjoining and on left of the old channel, for about half the length of the towhead. The excavated material, light sand, was discharged 350 feet to the left, on the bar, parallel to the channel. Before the work was finished the upper end of the cut had been widened to about 150 feet by scour. The channel remained open during the rest of the season.

Excavation made, September 13 to 27: Light sand, 14,381 cubic yards.

Sisters Island (*897 miles below Pittsburg*).—This point has been probably the most troublesome and dangerous for tows, as well as packets, between Evansville, Ind., and Paducah, Ky. There were two channels with approximately the same depth of water—the old channel down past the island, with a long, shallow crossing to the Illinois shore at the foot, and the new chute which has opened up within the past two years, following close to the Illinois shore. The latter, which was most in use by boats, had slightly better depth and shorter distances over shoal water, but was very crooked, and so narrow that the dredge working in it would probably have stopped navigation, as there was not room to move out of the way to let boats pass. It was therefore decided to open the old channel, which could be done without interfering with navigation. One cut, 3,078 feet long, 100 feet wide, and 4 feet below low water, was made through the crossing, after which three more cuts of the same width and depth were made at the head, widening the entrance to 400 feet for a distance of about 1,200 feet. This, with the assistance of the spoil bank cast up on the left, following the general course of the cuts, caused a flow of water through the channel, which kept it in good condition. The material excavated was sand, except for about 500 feet at the head, where very hard, though fine, gravel was found. Several wrecks of coal boats and flats were found in the line of the cuts and were destroyed by the dredge cutter, and one coal-barge wreck on left of the channel, opposite the foot of the island, was removed by blasting with dynamite.

As this channel does not coincide with the high-water flow, it will no doubt be filled with sand during the higher stages of the river, and the spoil bank, which was built 150 feet to 300 feet away on the left, as nearly as possible in the form of a dike, will be cut down by the current. It is considered, however, that the removal of a number of points of hard gravel and the clearing away of wrecks and logs from the line of the cut will leave only soft material to be washed out after the river falls again, and at least a part of the spoil bank will remain until next season to deflect the current and assist in scour on the line of the cut.

The low stage of river caused considerable delay to the work, mainly by preventing use of the dredge tender to move the hauling cable anchors. As these anchors often had to be placed on the bar, where there was less than a foot of water, it became necessary to move them by hand power, for which purpose one of the pontons was fitted with shears, tackle, and crab, answering very well, though of course much slower than handling in sufficient depth of water to permit use of the dredge tender.

Excavation made September 30 to December 16: Sand and gravel, 101,747 cubic yards; wrecks removed, coal-boat bottoms, 3; coal barge, 1; snags removed (6), 5 tons.

Dredging was discontinued on December 16, when cold weather and ice in the river made further operations impracticable.

On the 20th of December the plant was laid up in the mouth of the Tennessee River at Paducah, Ky., and the dredge tender was released, and after putting the plant in order for the winter the crew was discharged, with the exception of five men needed to watch and take care of it.

Summary of expenses for U. S. dredge Indiana.

General supplies and expenses	$2,431.23
Towing and fuel	9,141.99
Care and repair	1,712.06
Salaries	9,946.40
Explosives	51.02
Subsistence	1,241.94
Total	24,524.64

The excavation by the U. S. dredge *Indiana* during the fiscal year was 168,354 cubic yards of sand and gravel, and 6,826 cubic yards of hard gravel, bowlders, etc., making a total of 175,180 cubic yards, the cost of which, including all expenditures and outstanding liabilities, was 13.8 cents per cubic yard.

In addition the dredge removed from the channel, at an approximate cost of $403.06, 6 wrecks of coal boats and barges, and 20 snags weighing 21.4 tons.

The dredge *Indiana* was in commission one hundred and eighty-four days, and the effective working time was one hundred and one days, the time lost, eighty-three days, being accounted for by traveling, bad weather, repairs, Sundays and holidays, etc.

HIRED DREDGING PLANTS.

Under contract dated September 20, 1909, with the Sheridan-Kirk Contract Company for hire of dredging plant to operate between Evansville, Ind., and the mouth of the Ohio River, the plant left Fernbank, Ohio, on September 21, 1909, for Brookport, Ill., and after removing two snags from the channel at Sisters Island, arrived at Brookport, Ill., on October 3, 1909.

Brookport, Ill. (923 miles below Pittsburg).—The improvement at this place consisted in removing the deposit of sand and gravel, mud, drift, and wreckage in the harbor and about the approach of the Illinois Central Railroad transfer incline.

Dredging was begun at the entrance to the harbor, about 400 feet from shore and abreast of the public landing. The collection of sand, cemented gravel, wreckage, débris, etc., at the foot of the sand bar at this point prevented free entrance at low stages to the Illinois Central Railroad transfer incline. An area about 475 feet long, varying in width from about 45 feet to 150 feet, excavated to a depth of 7 feet below low water, was dredged. After clearing the entrance to the harbor, the dredge began the work of removing the deposit of mud, drift, wreckage, snags, etc., in the harbor. The dredging done extended from the railroad transfer incline downstream along the shore for a distance of about 1,320 feet. The area dredged varied in width from 50 feet at lower end of the harbor to about 140 feet above the ferry landing. In addition to this work, an area about 115 feet wide and 300 feet long was dredged along the guide pilings at the end of the transfer incline. Immediately along the upper side of the incline a cut 38 feet wide and 180 feet long, and adjoining this cut two cuts each about 38 feet wide and 130 feet long, extending upstream along the shore, were made. This work was done for the purpose of removing the fallen pilings, snags, mud, etc., in order to give a free passage of water and cause the current to prevent deposits below.

The work completed resulted in a much improved harbor. The greater portion of the excavated material was dumped to the left of the channel along the Kentucky shore, opposite Brookport. The snags removed were mostly loaded on cars and disposed of by the Illinois Central Railroad. The remainder were dumped with the excavated material or pulled out on shore and cut up and burned.

Excavation, October 2 to December 6, 1909:

Sand and gravel, mud, drift, wreckage, etc	cubic yards	31,480.2
Snags (352), tons, 273.1	do	316.1
Rocks (8), tons, 11	do	5.7
Total	do	31,802

The cost of dredging per cubic yard was 25.4+ cents.

ESTIMATE FOR APPROPRIATION.

Supervision of harbor lines at East Liverpool, Ohio; Steubenville, Ohio; Wheeling, W. Va.; Ironton, Ohio; and Cincinnati, Ohio; also Secretary of War permits and encroachments on the general river		$8,000
Minor examinations and surveys		9,000
Dredging operations:		
3 dipper dredges	$45,000	
1 hydraulic dredge	26,000	
		71,000
3 towboats (operating)		21,500
3 steel fuel flats for new towboats		22,500
Repairs to 3 dump scows		13,500
Hire of dredging plant for operations between Pennsylvania state line and Wheeling, W. Va		17,000
Hire of dredging plant for operations between Wheeling, W. Va., and Marietta, Ohio		17,000
General administration, engineering, inspection, etc		30,000
Contingencies		20,000
Total		229,500

Amounts and dates of all appropriations for this work.

Act of Congress.	Appropriation.	Allotment.	Remarks.
March 3, 1827	$30,000.00		
March 3, 1835	50,000.00		
July 2, 1836	20,000.00		
March 3, 1837	60,000.00		
July 7, 1838	50,000.00		
June 11, 1844	100,000.00		
March 3, 1847	6,479.25		
August 30, 1852	90,000.00		
June 23, 1866		$172,000.00	Improving Mississippi, Missouri, Arkansas, and Ohio rivers.
Do		80,000.00	Snag boats and apparatus for improving western rivers.
March 2, 1867	100,000.00		
July 25, 1868		85,000.00	Repair, preservation, extension, and completion of river and harbor works.
July 11, 1870	50,000.00		
March 3, 1871	50,000.00		
June 10, 1872	200,000.00		
March 3, 1873	200,000.00		
June 23, 1874	150,000.00		
March 3, 1875	300,000.00		
August 14, 1876	175,000.00		
June 18, 1878	300,000.00		
Do	50,000.00		Harbor of refuge at or near Cincinnati.
March 3, 1879	250,000.00		
June 14, 1880	250,000.00		
March 3, 1881	350,000.00		
March 21, 1882	100,000.00		Continuing work on Davis Island dam.
August 2, 1882	350,000.00		
Do	16,000.00		Harbor of refuge near Cincinnati, Ohio.
July 5, 1884	600,000.00		
Do	17,000.00		Do.
August 5, 1886	375,000.00		
August 11, 1888	380,000.00		
September 19, 1890	300,000.00		
January 19, 1891	2,128.87		Relief of Stubbs & Lackey. Treasury settlement No. 2593.
July 13, 1892	360,000.00		
August 18, 1894	250,000.00		
June 3, 1896	250,000.00		
July 1, 1898		15,000.00	For restoring levee and banks of Ohio River at or near Shawneetown, Ill.
March 3, 1899	375,000.00		
June 13, 1902	359,000.00		Amount appropriated, $400,000, $41,000 being for falls of Ohio River at Louisville, Ky.
July 1, 1902	25,000.00		Between Cairo and Mound City.
March 3, 1905	208,200.00		Amount appropriated, $300,000, $20,800 being for dredging in pool 6, Ohio River, $56,000 for survey of Ohio River, and $15,000 for rock removal at head of canal at falls at Louisville, Ky.
March 2, 1907	450,000.00		
Do	20,000.00		For Great Miami embankment east of Lawrenceburg, Ind.
March 3, 1909	150,000.00		Preservation and maintenance of river and harbor works.
June 25, 1910	550,000.00		
Total	7,968,808.12	352,000.00	

Total of appropriations, 1827–1910	$7,968,808.12	
Total of allotments, 1827–1898	352,000.00	
Received from sales, etc., 1866–1910	9,968.29	
Received from Treasury settlements, 1904, 1906	261.70	
Transferred from other appropriations, 1905	13,642.48	
		$8,344,680.59
Appropriations not drawn, 1827, 1852, and 1902	30,023.47	
Allotments not drawn, 1866, 1868	43,134.60	
Returned by Treasury settlements	30.07	
Amount transferred to other works	125,168.44	
Deposited to credit of "Miscellaneous receipts"	1,654.25	
Deposited to "Surplus fund"	12,204.06	
		212,214.89
Total		8,132,465.70

CONTRACTS IN FORCE.

Name of contractor: Knobloch & Shelton.

Amount and character of work: $53,204.60. Constructing dam at head of Marietta Island, Ohio River.

Price per unit: Excavation, at $0.95 per cubic yard, measured in the cut; piles, at $22 each; iron tie-rods and connections, at $0.08 per pound; earth filling, at $0.30 per cubic yard, measured in bank after settlement; stone filling (9 to 18 cubic feet each), at $2.45 per cubic yard in place; stone filling (¼ to 3 cubic feet each), at $1.95 per cubic yard in place; concrete masonry, at $7.77 per cubic yard in place; extra cement, at $2.50 per barrel, Atlas brand.

Date of approval: November 1, 1907.

Date of beginning: On or before June 1, 1908.

Date of expiration: Two hundred fair working days after commencement. Completed.

Name of contractor: Oscar F. Barrett.

Amount and character of work: $27,275. Building dike in Ohio River at Grand Chain, Ill.

Price per unit: Stone, 6 to 10 cubic feet each, at $3.25 per cubic yard; ¼ to 1½ cubic feet each, at $2.70 per cubic yard.

Date of approval: October 24, 1907.

Date of beginning: June 1, 1908.

Date of expiration: Two hundred fair working days after commencement. Completed.

Name of contractor: Advance Sand and Construction Company.

Amount and character of work: $44,670.75. Constructing dam at head of Browns Island, Ohio River.

Price per unit: Excavation, ledge rock, at $3.50 per cubic yard measured in the cut; excavation, loose material, at $0.90 per cubic yard measured in the cut; drilling anchor bolt holes, at $0.50 per linear foot of depth; piles, at $13 each; iron tie-rods, anchor bolts, and connections, at $0.07 per pound; stone filling (9 to 18 cubic feet each) at $3.50 per cubic yard in place; stone filling, including riprap bank protection (¼ to 3 cubic feet each), at $4 per cubic yard in place; earth filling, at $0.70 per cubic yard, measured in the bank after settlement; concrete, at $8.25 per cubic yard in place; extra cement, at $2.50 per barrel.

Date of approval: October 21, 1908.

Date of beginning: Ten days after date of notification of approval of contract.

Date of expiration: Two hundred fair working days after said date of notification.

Name of contractor: The Queen City Marine Railway Company.

Amount and character of work: $240. Rent of storage room.

Price per unit: $20 per month.

Lease dated December 31, 1908.

Date of beginning: January 1, 1909.

Date of expiration: December 31, 1909. Completed.

Name of contractor: H. B. Hulings.

Amount and character of work: $9,000. Hire of towboat, etc., as tender to U. S. dredge *Ohio*.

Price per unit: $50 per calendar day.

Date of approval: June 1, 1909.

Date of beginning: May 27, 1909, pending approval of contract.

Date of expiration: About December 1, 1909. Discharged December 22, 1909.

Name of contractor: Ohio Valley Towing Company.

Amount and character of work: $10,000. Hire of towboat, etc., as tender to U. S. dredge *Indiana*.

Price per unit: $54.85 per calendar day.

Date of approval: June 7, 1909.

Date of beginning: June 8, 1909.

Date of expiration: About December 1, 1909. Discharged December 20, 1909.

Name of contractor: Ed. J. Howard.
Amount and character of work: $7,500. Replating hull of U. S. dredge *Oswego*.
Price per unit: Replating hull, $7,300; angles of longitudinal frames, etc., replaced at $0.10 per pound; cutting out and replacing loose rivets, at $0.25 each.
Date of approval: Original contract, June 11, 1909; supplemental contract, June 15, 1909.
Date of beginning: Ten days after date of notification of approval of contract.
Date of expiration: Seventy calendar days after said ten days. Completed.

Name of contractor: Oscar F. Barrett.
Amount and character of work: $2,165.50. Hire of dredging plant for removing rocks at Grand Chain, Ohio River.
Price per unit: $47 per day from the time the plant is delivered to the United States at Cairo, Ill., until its return to said place, subject to a deduction of $20 per day for Sundays and legal national holidays while at Grand Chain, unless the plant should be required to work on such days.
Emergency contract dated September 7, 1909.
Date of beginning: September 13, 1909.
Date of expiration: October 29, 1909. Discharged.

Name of contractor: Robert B. Pope.
Amount and character of work: $225. Hire of gasoline boat.
Price per unit: $5 per day of twelve hours; over twelve hours, one-twelfth of the contract price per day for each hour employed.
Emergency contract dated September 9, 1909.
Date of beginning: September 10, 1909.
Date of expiration: November 2, 1909. Discharged.

Name of contractor: Sheridan-Kirk Contract Company.
Amount and character of work: $7,834.52. Hire of dredging plant.
Price per unit: $95 per calendar day, Sundays and legal holidays excepted, from time plant is delivered to the United States at Fernbank, Ohio, until its return to said place.
Date of approval: October 2, 1909.
Date of beginning: September 21, 1909.
Date of expiration: December 21, 1909. Discharged.

Name of contractor: E. J. Hulings.
Amount and character of work: $936.46. Hire of towboat, etc., as tender to U. S. dredge *Oswego*.
Price per unit: $48 per calendar day.
Emergency contract dated December 1, 1909.
Date of beginning: December 1, 1909.
Date of expiration: Continue until discharged. Discharged December 14, 1909.

Name of contractor: Lewis E. Bedinger.
Amount and character of work: $424. Gasoline motor.
Price per unit: $424.
Emergency contract dated March 9, 1910.
Date of beginning: April 2, 1910.
Date of expiration: May 1, 1910. Completed.

Name of contractor: H. B. Hulings.
Amount and character of work: $98. Hire of decked flat.
Price per unit: $2 per day.
Lease dated March 19, 1910.
Date of beginning: March 21, 1910.
Date of expiration: When discharged. Completed.

Name of contractor: Kanawha Dock Company.
Amount and character of work: $978.49. Docking and repairing two dump scows.
Price per unit: For towing and docking scows, $210; holding on dock over ten days, $5 per day each; white oak or white pine lumber, $50 per 1,000 feet b. m.; spruce lumber, $45 per 1,000 feet b. m.; oakum, $0.10 per pound; red lead in oil, $0.10 per pound; spikes, $0.04 per pound; nails, $0.035 per pound; pitch, $0.035 per pound; bolts, nuts, and washers, $0.06 per pound; services per hour: Foreman, $0.50; calkers and carpenters, $0.40; blacksmiths, $0.50; laborers, $0.25.

Emergency contract dated March 23, 1910.
Date of beginning: March 29, 1910.
Date of expiration: May 8, 1910. Completed.

Name of contractor: H. B. Hulings.
Amount and character of work: $10,000. Hire of towboat, etc., as tender to United States dredge.
Price per unit: $50 per calendar day.
Date of approval: May 7, 1910.
Date of beginning: May 9, 1910.
Date of expiration: About December 1, 1910.

Name of contractor: The Ohio River Contract Company.
Amount and character of work: $9,000. Hire of towboat, etc., as tender to U. S. dredge *Indiana*.
Price per unit: $53.45 per calendar day.
Date of approval: May 17, 1910.
Date of beginning: When ordered.
Date of expiration: About December 1, 1910.

Name of contractor: Flesher Towboat and Barge Line.
Amount and character of work: $10,000. Hire of towboat, etc., as tender to United States dredge.
Price per unit: $49.49 per calendar day.
Date of approval: June 3, 1910.
Date of beginning: May 11, 1910, pending approval of contract.
Date of expiration: About December 1, 1910.

Name of contractor: The McIlvain & Spiegel Boiler and Tank Company.
Amount and character of work: $490. Construction of one dredge dipper.
Price per unit: $490.
Emergency contract dated June 4, 1910.
Date of beginning: Five days after delivery of material by the United States.
Date of expiration: Sixty days after expiration of said five days.

STAGES OF OHIO RIVER IN 1909.

The following are the records of the gauges at Dam No. 6, Cincinnati, and Evansville, which may be taken to represent the navigable conditions of the upper, middle, and lower Ohio.

Gauge at Dam No. 6, near Beaver, Pa.

[Gauge readings show navigable depth on shoal below lock.]

Month.	Depth in channel.			Gauge readings.	
	Under 3 feet.	3 feet and over.	6 feet and over.	Highest.	Lowest.
1909.	*Days.*	*Days.*	*Days.*	*Feet.*	*Feet.*
January	0	31	28	20.9	4.3
February	0	28	28	32.5	6.0
March	0	31	31	19.4	7.8
April	0	30	30	20.6	9.7
May	0	31	27	32.1	5.0
June	0	30	25	15.1	4.6
July	6	25	3	7.6	2.5
August	12	19	1	7.7	2.0
September	21	9	0	5.0	1.9
October	15	16	4	12.2	1.6
November	1	29	2	7.8	2.9
December	1	30	5	8.2	2.9
Total	56	309	184	....	....

Cincinnati gauge.

[The zero of this gauge is about 2 feet below low water; readings of about 4 feet correspond to about 3 feet in the channel, and those of 7 feet to about 6 feet in the channel.]

Month.	Depth in channel.			Gauge readings.	
	Under 3 feet.	3 feet and over.	6 feet and over.	Highest.	Lowest.
1909.	*Days.*	*Days.*	*Days.*	*Feet.*	*Feet.*
January	0	31	31	26.4	9.9
February	0	28	28	54.6	13.5
March	0	31	31	54.1	17.2
April	0	30	30	34.2	18.9
May	0	31	31	47.0	16.0
June	0	30	30	28.8	14.0
July	0	31	31	20.2	7.3
August	0	31	31	15.4	6.8
September	0	30	15	7.3	5.1
October	0	31	6	11.2	3.6
November	0	30	23	11.0	5.1
December	0	31	31	13.2	6.5
Total	0	365	318	....	....

Evansville gauge.

[The zero of this gauge is about at low-water line; readings of 2 feet correspond to about 3 feet in the channel, and readings of 6 feet correspond to about 6 feet in the channel.]

Month.	Depth in channel.			Gauge readings.	
	Under 3 feet.	3 feet and over.	6 feet and over.	Highest.	Lowest.
1909.	*Days.*	*Days.*	*Days.*	*Feet.*	*Feet.*
January	0	31	31	19.9	7.1
February	0	28	28	42.6	13.2
March	0	31	31	43.2	15.1
April	0	30	30	28.7	17.1
May	0	31	31	35.7	13.6
June	0	30	30	22.2	11.6
July	0	31	31	23.4	6.8
August	0	31	31	11.9	6.2
September	0	30	0	5.9	3.9
October	13	18	0	4.5	2.4
November	0	30	3	6.7	3.4
December	0	31	21	10.2	4.7
Total	13	352	267	....	....

STAGES OF THE OHIO RIVER.

Highest, lowest, and average stages of the Ohio River at Cincinnati each calendar year from 1858 to 1909, inclusive, with the highest stage during the floods of 1832 and 1847.

Calendar year.	Highest stage.		Lowest stage.		Average for the year.
	Date.	Stage.	Date.	Stage.	
		Feet.		*Feet.*	*Feet.*
1832	Feb. 18	64.2	....	....	....
1847	Dec. 17	63.6	....	....	....
1858	June 16	43.7	Sept. 28	2.4	13.9
1859	Feb. 22	55.3	Sept. 18	3.3	18.7
1860	Apr. 16	49.2	Oct. 3	5.3	16.0
1861	Apr. 19	49.4	July 13	5.1	19.1
1862	Jan. 24	57.8	Oct. 31	2.3	17.4
1863	Mar. 12	42.7	Oct. 6	2.5	15.0
1864	Dec. 23	45.1	Aug. 6	3.1	16.7
1865	Mar. 7	56.2	Oct. 19	5.7	21.8
1866	Sept. 26	42.5	Aug. 17	4.7	19.2
1867	Mar. 14	55.7	Oct. 19	3.0	17.0

Highest, lowest, and average stages of the Ohio River at Cincinnati, etc.—Cont'd.

Calendar year.	Highest stage.		Lowest stage.		Average for the year.
	Date.	Stage.	Date.	Stage.	
		Feet.		*Feet.*	*Feet.*
1868	Mar. 30	48.2	July 21	5.1	18.7
1869	Apr. 2	48.7	Aug. 21	5.3	19.7
1870	Jan. 19	55.2	Oct. 4	3.8	17.8
1871	May 13	40.5	Oct. 12	2.7	11.8
1872	Apr. 13	41.7	Oct. 14	3.0	11.7
1873	Dec. 18	44.4	Oct. 12	3.7	18.4
1874	Jan. 11	47.9	Sept. 22	2.3	15.7
1875	Aug. 6	55.3	Sept. 19	4.2	18.7
1876	Jan. 29	51.7	Sept. 4	6.2	18.2
1877	Jan. 20	53.7	Oct. 9	3.2	15.0
1878	Dec. 15	41.3	Oct. 24	4.3	16.7
1879	Dec. 27	42.7	Oct. 23	2.5	14.5
1880	Feb. 17	53.1	Oct. 28	3.7	17.0
1881	Feb. 16	50.6	Sept. 18	1.9	16.9
1882	Feb. 21	58.6	Nov. 1	6.1	[a] 22.1
1883	Feb. 15	66.3	Sept. 21	3.6	[a] 19.5
1884	Feb. 14	71.0	....do	2.7	[a] 17.3
1885	Jan. 20	46.0	Sept. 26	2.5	[a] 15.6
1886	Apr. 9	55.7	Nov. 1	3.3	[a] 17.8
1887	Feb. 5	56.2	Sept. 23	2.7	[a] 15.1
1888	Apr. 1	39.9	Aug. 7	5.2	[a] 17.9
1889	Feb. 22	38.2	Sept. 13	5.2	[a] 18.5
1890	Mar. 26	59.2	Aug. 30	5.7	[a] 25.7
1891	Feb. 25	57.3	Oct. 7	4.4	[a] 20.5
1892	Apr. 25	43.7	Nov. 5	3.4	[a] 16.5
1893	Feb. 20	54.9	Aug. 30	3.6	[a] 17.7
1894	Feb. 15	35.6	Sept. 14	3.1	[a] 12.9
1895	Jan. 14	48.4	Oct. 28	2.3	[a] 12.2
1896	Apr. 4	47.8	Sept. 25	5.5	[a] 16.7
1897	Feb. 26	61.2	Oct. 18	3.1	[a] 16.5
1898	Mar. 29	61.4	Oct. 6	4.5	[a] 19.7
1899	Mar. 8	57.4	Nov. 2	3.4	17.1
1900	Dec. 1	40.0	Oct. 21	3.2	13.8
1901	Apr. 26	59.7	Nov. 11	4.2	17.6
1902	Mar. 5	50.9	Sept. 24–25	3.9	16.8
1903	....do	53.1	Oct. 7, Nov. 11–16	4.5	17.9
1904	Mar. 9	45.9	Oct. 6–7	3.3	14.6
1905	May 16	48.2	....do	6.5	18.2
1906	Apr. 2	50.2	Sept. 22	7.1	17.7
1907	Jan. 21 Mar. 19	65.2 62.1	Oct. 31	7.0	22.7
1908	Apr. 4	55.7	Oct. 6–7	2.5	17.7
1909	Feb. 28	54.6	Oct. 15	3.6	[b] 16.1

[a] Prepared from the stages as shown by the waterworks marks daily at 6 a. m. and 6 p. m., the previous and succeeding years having been made from one daily observation at 6 a. m.

[b] Prepared from observations taken at 7 a. m. by Weather Bureau.

MONTHLY COMPARISONS OF RIVER AND RAINFALL.

Highest, lowest, and average monthly stages of the Ohio River and monthly and annual rainfall at Cincinnati in two years ending December 31, 1908 and 1909.

Month.	Highest.				Lowest.				Average.		Rainfall.	
	1909.		1908.		1909.		1908.		1909.	1908.	1909.	1908.
	Date.	*Feet.*	*Date.*	*Feet.*	*Date.*	*Feet.*	*Date.*	*Feet.*	*Feet.*	*Feet.*	*Inches.*	*Inches.*
January	30	26.4	18	29.9	2	9.9	28	14.5	17.4	21.9	2.57	1.40
February	28	54.6	20	51.1	8	13.5	1	18.8	30.2	32.2	5.65	4.50
March	1	54.1	11–12	53.2	25	17.2	1	21.7	31.8	41.9	2.44	3.66
April	27	34.2	4	55.7	17	18.9	30	21.5	25.5	35.8	3.62	4.07
May	6	47.0	9	44.1	23	16.0	31	20.0	28.2	30.7	4.21	5.84
June	12	28.8	1	17.4	5	14.0	18	9.2	20.1	12.9	5.06	2.00
July	10	20.2	31	15.2	30	7.3	20	7.4	13.3	10.0	3.83	.83
August	16	15.4	1	15.3	31	6.8	29	5.4	10.2	8.6	1.82	1.69
September	17	7.3	1	8.4	8	5.1	28	2.9	6.0	4.4	1.39	.26
October	31	11.2	30	7.5	15	3.6	5–7	2.8	5.2	3.6	3.02	.35
November	1	11.0	5	7.8	9	5.1	11	3.7	6.7	4.7	1.42	1.09
December	19	13.2	30	12.2	12	6.5	3–6	4.0	9.0	6.8	2.40	1.60
The year	[a] 28	54.6	[b] 4	55.7	[c] 15	3.6	[c] 5–7	2.8	16.1	17.8	37.43	27.29

[a] February. [b] April. [c] October.

LOSSES BY COLLISION WITH BRIDGES.

The following table shows the reported losses sustained by the commerce of the Ohio River by collision with the piers of bridges crossing the Ohio River to the end of the calendar year 1909:

Date, etc.	Owner.	Steamboat.	Loss.	Amount.
Parkersburg bridge:				
Previously reported				$115,248.47
January 9, 1909	People's Coal Co	G. W. Thomas	Barge	1,000.00
Total				116,248.47

NOTE.—The above loss was reported by the owners.

Losses by collision with Ohio River bridges to December 31, 1909.

Ohio Connecting Railway bridge	$3,500.00
Beaver bridge	91,140.00
East Liverpool bridge	3,500.00
Steubenville bridge	140,758.00
Wheeling and Martins Ferry bridge	12,150.00
Bellaire bridge	150,126.00
Parkersburg bridge	116,248.47
Point Pleasant bridge	9,650.00
Kenova bridge	77,950.00
Ashland and Ironton bridge	25,000.00
Newport and Cincinnati railway and highway bridge	48,107.00
Newport and Cincinnati highway bridge	750.00
Covington and Cincinnati railroad bridge	108,200.00
Cincinnati Southern bridge	14,812.00
Louisville and Jeffersonville bridge	8,000.00
Ohio Falls bridge	207,600.00
Kentucky and Indiana bridge	34,267.00
Henderson bridge	40,710.00
Cairo bridge	49,169.95
Total	1,141,638.42

COMMERCIAL STATISTICS.

Commerce of Ohio River in 1909.

[Compiled from reports made by owners, agents, and masters of vessels and transportation companies, in compliance with act of Congress approved February 21, 1891—Public, No. 92.]

Name of boat or company.	Terminal points.	Distance.	In commission.	Freight.	Passengers.
		Miles.	*Months.*	*Tons.*	
The Monongahela River Consolidated Coal and Coke Co.	Pittsburg to Cairo	965.0	12.0	779,213	
	Pittsburg to Louisville	598.0	12.0	380,043	
	Pittsburg to Cincinnati	468.4	12.0	402,900	
Diamond Coal Co	Pittsburg to Cairo	965.0	5.0	35,278	
Peoples Coal Co	Pittsburg to Louisville	598.0	10.0	153,337	
The A. R. Budd Co	do	598.0	7.0	74,000	
United Coal Co	Pittsburg to Cincinnati	468.4	12.0	52,093	
Steamer Virginia	do	468.4	5.5	14,200	4,250
Steamer Queen City	do	468.4	5.0	11,400	9,895
Steamer Ohio	do	468.4	7.0	12,000	6,000
Steamer Kanawha	Pittsburg to Gallipolis	269.1	7.0	5,600	3,600
Steamer Darling	Pittsburg to Point Pleasant, W. Va.	264.5	7.0	14,427	
Steamer H. K. Bedford	Pittsburg to Parkersburg	184.1	8.0	8,000	7,000
Steamer Lorena	Pittsburg to Marietta	171.3	5.0	3,000	2,965
Clyde Coal Co	Pittsburg to Bellaire	93.9	12.0	6,487	
John F. Klein	Pittsburg to Rochester	24.8	5.0		78,825

Commerce of Ohio River in 1909—Continued.

Name of boat or company.	Terminal points.	Distance.	In commission.	Freight.	Passengers.
		Miles.	*Months.*	*Tons.*	
Steamer Sunshine	Pittsburg to Rochester	24.8	4.0	....	75,000
Fidelity Ferry Company	Allegheny to Bellevue	4.5	12.0	331	273,050
Steamer Short Cut	Allegheny to West Pittsburg	1.0	12.0	6,200	69,100
Steamer Crusoe	Wellsville to Congo	1.0	12.0	5,000	2,500
Steamer Katie Mc	New Cumberland to Louisville.	541.8	3.0	9,000	....
Steamer Shifter	Steubenville to Little Hocking.	123.5	6.0	700	1,250
Armstrong Sand Co	Wellsburg to Moundsville	27.7	8.0	30,000	
Steamer Della M	Mingo to opposite shore	1.0	12.0	356	4,015
Wellsburg, Brilliant & Buckeye Ferry Co.	Brilliant to Wellsburg	1.0	12.0	40,000	85,000
Steamer Bessie Smith	Wheeling to Cincinnati	378.3	9.5	13,650	7,498
Steamer Beaver	Wheeling to Point Pleasant, W. Va.	174.4	10.0	5,000	1,200
Steamer Ruth	Wheeling to New Matamoras	51.8	6.0	11,250	5,175
Steamer Royal	Wheeling to Clarington	27.5	8.0	3,545	4,794
Steamer Liberty	do	27.5	2.0	250	406
Steamer Monitor	Wheeling to West Wheeling	1.0	10.0	50,842	....
Bellaire, Benwood and Wheeling Ferry Co.	Benwood to Bellaire	1.0	12.0	....	334,376
Steamer Daniel	Sistersville to Tuels Landing	1.0	12.0	15,650	43,200
Steamer Melia A	New Matamoras to Friendly	1.0	11.0	1,000	17,500
Steamer Valley Belle	Marietta to Middleport	79.7	8.0	450	1,505
Steamer Sea Lion	Parkersburg to Louisville	413.9	12.0	126,000	....
Steamer W. O. Hughart	Parkersburg to Point Pleasant.	80.4	12.0	248	13,897
Steamer Katydid	Parkersburg to Belleville	18.8	8.0	800	4,000
Steamer Nina Paden	Parkersburg to Belpre	1.0	12.0	55,000	262,893
Steamer Klondike	Syracuse to Gallipolis	24.1	11.0	1,500	6,500
Steamer Convoy	Pomeroy to Louisville	348.5	10.0	85,300	....
Steamer Douglas Hall	do	348.5	5.0	85,000	....
Steamer J. T. Hatfield	do	348.5	7.5	189,264	....
Green Line Packet Co	Pomeroy to Cincinnati	218.9	11.0	60,000	31,000
Steamer Cricket	do	218.9	7.0	2,240	....
Steamer Ada V	do	218.9	6.0	8,000	....
Steamer Champion No. 3	Pomeroy to Mason City	1.0	12.0	1,000	55,000
Campbell Creek Coal Co	Point Pleasant to Louisville	333.5	10.0	285,490	....
Steamer Monie Bauer	do	333.5	7.0	4,000	300
Steamer Marien Riggs	do	333.5	7.0	105,000	....
The Otto Marmet Coal and Mining Co.	do	333.5	12.0	162,000	....
Steamer J. B. Lewis	do	333.5	10.0	115,000	....
Steamer Geo. Matheson	do	333.5	9.0	89,500	....
Steamer Alert	Point Pleasant to Madison	288.5	11.0	189,040	....
Steamer Island Queen	Point Pleasant to Aurora	230.3	1.0	46	50,697
Steamer Mountain Queen	Point Pleasant to Cincinnati	203.9	9.0	1,000	....
Steamer Winifred	do	203.9	12.0	92,686	....
The Marmet Coal Co	do	203.9	9.0	176,377	....
Steamer Oriole	Point Pleasant to Huntington	43.3	11.0	7,800	19,250
Steamer Boone No. 4	Point Pleasant to Kanauga	1.0	9.0	3,700	60,765
Steamer Carrie Brown	Gallipolis to Huntington	38.7	10.0	5,600	20,100
Steamer Francis	Gallipolis to Steambergens	1.0	12.0	2,955	45,050
Steamer Greyhound	Proctorville to Portsmouth	51.1	11.5	10,500	13,200
Steamer Arion	Proctorville to Guyandotte	1.0	12.0	55,000	120,000
C. Crane & Co	Guyandotte to Cincinnati	163.8	8.0	180,000	....
Steamer Mildred Runyon	do	163.8	12.0	15,500	....
Island Creek Fuel Co	Huntington to Sekitan	175.3	6.0	265,182	....
Ohio River Contract Co	Huntington to Carrollton	233.2	5.0	3,771	....
Steamer Thealka	Huntington to Portsmouth	47.4	1.0	137	52
Steamer City of Huntington	Huntington to Chesapeake	1.0	12.0	....	58,264
Steamer Central City	Central City to Dillon Landing.	1.0	9.0	5,400	10,025
Steamer Enquirer	Catlettsburg to Louisville	281.3	6.0	14,000	....
Steamer Castalia	Catlettsburg to Cincinnati	151.7	9.0	25,000	....
Steamer Bonne	Catlettsburg to South Point	1.0	12.0	6,170	20,405
Steamer Wenona	Ashland to Coal Grove	1.0	12.0	....	404,243
Steamer Bob Ballard	Ashland to Ironton	5.0	10.0	406,014	....
Steamer Ironton	Ironton to Russell	1.0	12.0	55,645	175,110
John Barrett & Son	Portsmouth to Cairo	609.8	7.0	54,000	....
Steamer Chesapeake	Portsmouth to South Portsmouth.	1.0	12.0	19,746	164,250
Steamer Emily	Portsmouth to Fullerton	1.0	12.0	60,000	33,930
Steamer Whisper	Manchester to Augusta	29.4	7.0	3,900	3,200
Steamer W. H. Whiteman	Manchester to South Manchester.	1.0	12.0	16,172	49,172
Steamer Laurence	Maysville to Aberdeen	1.0	12.0	3,300	40,132
Steamer Proctor K. Smiley	Ripley to South Ripley	1.0	10.0	6,454	68,098
Steamer Princess	New Richmond to Louisville	149.5	.5	21	19,436
Steamer New Richmond	New Richmond, Ohio, to New Richmond, Ky.	1.0	12.0	15,189	15,271
Steamer Island Queen	Coney Island to Cincinnati	8.5	8.5	487	395,314

Commerce of Ohio River in 1909—Continued.

Name of boat or company.	Terminal points.	Distance.	In commission.	Freight.	Passengers.
		Miles.	*Months.*	*Tons.*	
Seamer Princess	Coney Island to Cincinnati	8.5	3.5	243	152,724
Steamer I. M. Grubbs	do	8.5	9.0	88,500	....
J. R. Ware & Sons	do	8.5	10.0	50,093	....
Smith Sand Co	Dayton to Addyston	16.5	10.0	42,496	....
Lee Line	Cincinnati to Cairo	496.6	6.0	7,828	1,863
Steamer E. T. Slider	Cincinnati to Evansville	314.6	4.0	84,737	....
Steamer Northern	do	314.6	8.0	61,137	....
Louisville and Cincinnati Packet Co.	Cincinnati to Louisville	129.6	12.0	142,765	93,743
Steamer Blue Wing	do	129.6	11.0	3,300	....
Steamer Kentucky	Cincinnati to Madison	84.6	11.0	26,919	6,424
Steamer Mildred	Cincinnati to Lawrenceburg	22.7	10.0	138,600	....
Steamer Boone No. 5	Cincinnati to Constance	1.0	12.0	29,500	23,000
Steamer Pauline	Lawrenceburg to Aurora	3.7	11.5	7,263	9,684
Steamer Swan	Aurora to Patriot	19.7	11.0	880	6,600
Steamer Lucile	Vevay to Louisville	65.0	10.0	4,564	....
Steamer Everett	Vevay to Ghent	1.0	8.0	150,000	12,006
Ohio Valley Towing Co	Carrollton to Green River	234.5	3.0	15,000	....
Steamer Park City	Carrollton to Louisville	57.0	4.0	6,000	1,500
Louisville and Jeffersonville Ferry Co.	do	57.0	4.0	....	134,590
Steamer Hanover	Carrollton to Madison	14.0	8.0	3,400	2,915
Steamer White Dove	do	14.0	7.0	3,500	5,000
Kentucky and Indiana Ferry Co.	Milton to Madison	1.0	11.0	16,300	62,305
Steamer Duffy	Twelve-Mile Island to Louisville.	12.0	11.0	289,878	....
Steamer Alys Gray	Utica to Louisville	6.5	9.0	35,000	....
Louisville and Jeffersonville Ferry Co.	Jeffersonville to Louisville	1.0	12.0	....	569,185
Louisville and Evansville Packet Co.	Louisville to Evansville	185.0	12.0	80,318	13,457
Steamer Alma	do	185.0	10.0	7,309	....
Steamer Clermond	Louisville to Leavenworth	60.0	6.0	48,700	485
Steamer Hiawatha	Louisville to excursion points	10.0	5.0	....	51,000
Steamer Little Archie	Brandenburg to Owensboro	110.5	10.0	4,000	....
Robert Hornbrook	Cannelton to Shawneetown	131.0	9.0	306,400	11,975
Steamer Major	Cannelton to Hawesville	1.0	11.0	313	7,100
Steamer J. B. A	Newburg to Evansville	14.0	12.0	39,841	....
Ayer & Lord Tie Co	Mouth Green River to Cairo	189.5	7.0	93,886	....
Pillsbury-Watkins Co	Mouth Green River to Joppa	160.5	10.0	72,536	....
Steamer Neptune	Mouth Green River to Paducah.	144.5	4.0	7,200	....
Steamer Alfred D. Owen	Mouth Green River to Shawneetown.	72.5	10.0	758	268
Steamer Alice L. Barr	Mouth Green River to Mount Vernon.	44.0	9.0	94,564	....
Steamer Sunbeam	do	44.0	4.0	27,435	....
Steamer Spottsville	Mouth Green River to Evansville.	8.0	12.0	1,560	8,400
Steamer Mabel	do	8.0	9.0	10,640	....
P. H. Johnston	do	8.0	5.0	23,500	....
Steamer Emma	do	8.0	12.0	4,911	....
Evansville and Bowling Green Packet Co.	do	8.0	12.0	27,800	10,982
Ryman Line	Evansville to Cairo	182.0	9.0	22,000	5,450
Steamer I. N. Flesher	do	182.0	10.0	93,600	8,000
Steamer Joe Fowler	Evansville to Paducah	137.0	10.0	17,840	9,065
Steamer John S. Hopkins	do	137.0	9.0	18,112	8,982
Steamer John W. Love	do	137.0	2.0	3,500	....
Steamer Concrete	do	137.0	5.0	2,000	....
Steamer Enos Taylor	Evansville to Rose Clare	98.0	11.0	29,000	....
Steamer New Haven	Evansville to Shawneetown	65.0	10.0	350	....
Steamer Ida M	do	65.0	8.0	52,000	....
Steamer Jewel	Evansville to Henderson	11.0	9.5	4,135	35,089
Steamer Francis	Evansville to Vicinity	10.0	1 day.	....	360
Steamer Charles Turner	Uniontown to Smithland	75.0	2.0	1,000	....
Steamer Kentucky	Shawneetown to Blackburn Landing.	1.0	4.0	....	6,500
West Kentucky Coal Co	Caseyville to Cairo	104.5	12.0	276,352	....
Chicago and Eastern Illinois R. R. Co.	Rose Clare to Cairo	85.0	12.0	3,601	....
Steamer Noxall	Carsville to Paducah	39.0	1.0	5	....
Steamer Bernice	Fairview Landing to Golconda.	12.0	11.0	38,325	....
Steamer Indiana	Golconda to Paducah	30.0	9.0	714	590
Steamer Royal	do	30.0	12.0	19,500	17,703
Steamer Kentucky	Golconda to Comptons Landing.	1.0	12.0	1,500	14,310
Steamer American	Smithland to Cairo	57.0	10.0	250,000	....
Holcomb-Hays Co	Smithland to Joppa	28.0	8.0	30,950	....

Commerce of Ohio River in 1909—Continued.

Name of boat or company.	Terminal points.	Distance.	In commission.	Freight.	Passengers.
		Miles.	*Months.*	*Tons.*	
Steamer Henrietta............	Smithland to Joppa..........	28.0	6.6	188,128	....
Steamer Nellie................	Smithland to Metropolis......	22.0	7.0	75,000	....
Tyner Line....................	Smithland to Paducah........	12.0	4.5	2,663	3,285
Steamer I. N. Hook...........	Paducah to Cairo............	45.0	12.0	32,962	....
Steamer Dick Fowler..........	.....do......................	45.0	9.0	7,120	44,500
Steamer E. A. Voight.........	.....do......................	45.0	3.0	21,328	....
St. Louis and Tennessee River Packet Co.	.....do......................	45.0	12.0	64,549	12,174
Steamer George Cowling.......	Paducah to Metropolis........	9.0	12.0	7,082	53,963
Steamer Bettie Owen..........	Paducah to Brookport........	3.0	10.5	17,095	40,107
Illinois Central Railroad Co....	.....do......................	3.0	12.0	98,770	23,962
Steamer John S. Summers.....	Mound City to Cairo..........	6.0	8.0	21,600	....
	Total..................	....	....	8,676,701	4,671,794

D D 2.

CONSTRUCTION OF LOCK AND DAM NO. 37, OHIO RIVER.

The general project for this work is printed in House Document No. 336, Fifty-seventh Congress, first session, and was adopted by Congress in the river and harbor act of June 13, 1902, by appropriating $100,000 for commencing operations and authorizing their completion under the continuing-contract system, at a total cost not exceeding $1,050,000. The river and harbor act of March 2, 1907, authorized the expenditure of $100,000 in excess of amounts heretofore appropriated or authorized: "*Provided*, That the said lock and dam shall be constructed with a view to a navigable depth of nine feet."

The river and harbor act of March 3, 1909, further increased the authorization for this work by $150,000, making a total authorization of $1,300,000, which has all been appropriated.

A description of preliminary work in connection with the construction of the lock and dam is given in reports of the Chief of Engineers for 1903, page 1645, and 1904, pages 2428 to 2430, inclusive. Statements of actual construction are given in reports of the Chief of Engineers as follows: 1905, pages 1816 to 1819, inclusive; 1906, pages 1564 to 1567, inclusive; 1907, pages 1670 to 1673, inclusive; 1908, pages 1751 to 1756, inclusive; and 1909, pages 1743 to 1749, inclusive.

The work of lock and dam construction is being carried on under contract with Sheridan-Kirk Contract Company, dated October 27, and approved November 17, 1904.

OPERATIONS FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

River conditions.—The river reached a favorable stage for the prosecution of the work late in July, no delays from high water occurring during the remainder of the working season.

On two occasions since the close of the working season (April 17–18 and June 1–6, 1910) contractors endeavored to pump out the cofferdam inclosing remaining section of permanent dam, but in each instance, before the cofferdam could be entirely pumped out, freshets occurred and compelled the removal of pumping plant from the cofferdam.

From July 1, 1909, to June 30, 1910, contractors were charged with eighty-nine fair working days.

Cofferdams.—The removal from the river of the cofferdams surrounding the finished work of lock and dam was completed July 30, and the main river channel for a width of 500 feet, that had been closed during construction of the first section of permanent dam, was opened to navigation on August 1.

The construction of the cofferdam to inclose remaining section of permanent dam and the bear traps was begun August 2; this cofferdam, having a length of 560 linear feet and inclosing an area 240 feet in width, with its protection of piles and cribs, was completed September 14.

The cofferdam and protection constructed was as follows:

Cofferdam 20 feet wide	linear feet	1,147.1
Temporary piling	number	75
Crib timbers	feet b. m.	18,240
Stone filling	cubic yards	172

Clearing land.—The necessary clearing of the banks of trees, logs, stumps, etc., was completed, nine-tenths acre being cleared on the Kentucky shore.

Ordinary excavation.—The excavation of loose material for foundations of permanent dam and bear traps, and in the upper and lower approaches to lock, was entirely completed; this work was also completed in the approaches to navigable pass for a width of about 500 feet in main-river channel. A part of the excavation required for placing the concrete-bank protection on the Kentucky shore was finished and a small amount of loose material was removed for foundations of permanent buildings.

The following ordinary excavation was completed:

Ordinary excavation	cubic yards	22,680

Deposit excavation.—The following material, deposited during times of freshets within the cofferdam inclosures, was excavated from the navigable pass, upper guide wall, lock gates, etc.:

Deposit excavation	cubic yards	1,421

Rock excavation.—The excavation of bed rock for foundation of permanent dam and bear traps was entirely completed; the rock excavation required in lower entrance to the lock chamber was completed and a small amount of rock was removed in lower approach to navigable pass. The following rock was removed:

Rock excavation	cubic yards	17,274

Ordinary filling.—The refilling required back of land and upper guide walls of lock and at rear of abutment of dam was entirely completed; the refilling around permanent dam foundation was also finished except some leveling off.

About 5,000 cubic yards of earth filling was placed in the terrace on Ohio shore and about 2,000 cubic yards on the Kentucky shore in connection with bank protection.

The following ordinary filling was completed:

Ordinary filling	cubic yards	28,064

Concrete masonry.—Of the 344 linear feet of masonry required to complete the subfoundation of permanent dam, 300 linear feet was entirely completed and the remaining section (44 linear feet) was carried to within 2½ feet of required elevation of substructure.

The masonry of the bear traps was completed except the superstructure of the piers.

A small quantity of concrete was placed in connection with the foundations of permanent buildings.

Concrete masonry as follows was placed:

Concrete masonry	cubic yards	10,591

Thirteen thousand six hundred and sixty-five barrels of cement (furnished by the United States) was used in the concrete placed.

Brick paving.—All brick paving required for the esplanade at rear of land and guiding walls of lock and at foot of slope below the lock was completed as follows:

Brick paving	square yards	9,602

Combination gutter curb.—The following gutter curb (concrete) of permanent roadway in lock grounds was constructed:

Combination gutter curb	linear feet	1,788

Open gutter.—The open gutter (concrete) provided at base of slope walls on Ohio shore was entirely completed, as follows:

Open gutter	linear feet	1,983

Ironwork.—The ironwork furnished under original contract and placed in final position consisted of the cast-iron anchor plates and wrought-iron anchor bolts and washers, securing the pedestals of bear traps in the concrete masonry, as follows:

Cast iron	pounds	19,108
Wrought iron and steel	do	23,635

The 8-inch pipe line to supply compressed air for the operation of bear-trap dams was extended from the abutment of dam on Kentucky shore to the outer bear-trap pier; this pipe was as follows:

Iron pipe, 8 inches in diameter	linear feet	281

Bear traps.—The pedestals and pedestal covers of the three bear traps, with their supports embedded in the concrete masonry of the foundation, were placed in position; the metal work of the bear trap adjoining abutment of dam was erected in place and painted as required; the oak sill of the three bear traps was completed.

The above work, in connection with the construction of bear traps under supplemental contract dated June 22, 1907, was as follows:

Wrought iron and steel, steel castings, cast iron, and steel springs	pounds	324,227
Bronze, brass pipe, copper, and Babbitt metal	do	800
4-inch wrought-iron pipe	linear feet	125
4-inch elbows	number	6
4-inch couplings	do	6
White-oak timber	feet, b. m.	2,778

A shipment of 1,999 pounds of ironwork, received at the site in September, completed the delivery of metal work for bear traps; 39,789 feet, b. m., of white-oak timber for sheeting of bear traps was prepared in advance and stored on the site by contractors.

Partial payment was made on the above material under paragraph 48 of the specifications.

Concrete facing on slopes.—The protection of the banks by slope walls having a facing of concrete, as provided by supplemental contract, dated October 1, 1908, was completed on the Ohio shore, except a portion of that required along permanent roadway leading up the slope from lock esplanade. Concrete facing placed was as follows:

Concrete facing on slopes	cubic yards	4,523

Additional bank protection.—In connection with the construction of additional bank protection provided for the Kentucky shore by supplemental contract dated May 6, 1910, the following excavation and fill involved in this work was completed:

Excavation	cubic yards	2,822
Fill	do	990

Cement.—There was delivered at the site 17,044 barrels of Portland cement; 4,500 barrels furnished by the Lehigh Portland Cement Company under contract dated November 11, 1909; 4,544 barrels furnished by the Ironton Portland Cement Company under contract dated November 27, 1909; a purchase of 8,000 barrels was made in the open market after advertising.

Laboratory tests of the cement used in the work were made at the site.

The average quantity of cement used to 1 cubic yard of concrete since the beginning of the work has been 1.15 barrels.

Permanent buildings.—Two of the buildings required for the operation and care of the lock and dam were completed—the warehouse in September and the power house in October. Contract has been awarded for the construction of the permanent office building and bids have been invited for the erection of four lock-tenders' dwellings at the site.

Water system.—The well with its casing, piping, air pump, etc., for furnishing the water supply for lock and dam, was completed under contract with James Kinney, jr., dated April 11, 1910, except the final tests of well equipment.

The materials and labor required to entirely complete the water system have been provided for by contracts as follows:

The Des Moines Bridge and Iron Company will furnish and erect in place the water tank with its supporting steel tower, under contract dated April 11, 1910.

The Wm. T. Johnston Company, under contract dated April 12, 1910, will furnish the fire hydrants, all pipe and fittings for water mains, etc.

The Sheridan-Kirk Contract Company, under contract dated June 8, 1910, will furnish the necessary labor, etc., required to fit and connect in place all water mains (including excavation and refilling of trenches), fire hydrants, valves, pipe fittings, etc.

Machinery.—The G. & W. Manufacturing Company, contractors for furnishing and installing the operating machinery of lock and dam, under contract dated January 20, 1910, have delivered at the site about 20 per cent of the material to be furnished by them.

Maneuver boat.—On June 1, 1910, a contract was entered into for the construction of a maneuver boat hull to be used in connection with this dam. The bottom gunwales were framed ready to set up, and about 12 per cent of the floor timbers accepted.

The machinery and equipment, including an orange-peel bucket and two powerful steam pumps, will be installed by the United States.

Summary.—The following summary shows the work completed by contractors for the lock and dam during the fiscal year:

Cofferdam, 20 feet wide	linear feet	1,147.1
Temporary piling	number	75
Crib timbers	feet b. m.	18,240
Clearing land	acres	0.9
Ordinary excavation	cubic yards	22,680
Deposit excavation	do	1,421
Rock excavation	do	17,274
Ordinary filling	do	28,064
Stone filling	do	172
Concrete masonry	do	10,591
Brick paving	square yards	9,602
Combination gutter curb	linear feet	1,788
Open gutter	do	1,983
Cast iron	pounds	19,108
Wrought iron and steel	do	23,635
Iron pipe, 8 inches diameter	linear feet	281
Concrete facing on slopes	cubic yards	4,523
Additional bank protection:		
Excavation	do	2,822
Fill	do	990
Material delivered and paid for under paragraph 48 of the specifications:		
White oak timber	feet b. m.	39,789
Ironwork	pounds	1,999
Bear traps:		
Ironwork	do	324,227
Bronze, brass, copper, etc	do	800
White oak timber	feet b. m.	2,778
4-inch wrought-iron pipe	linear feet	125
4-inch elbows (screw ends)	number	6
4-inch recessed couplings	do	6

APPROPRIATIONS.

June 13, 1902	$100,000
March 3, 1903	400,000
March 3, 1905	50,000
March 4, 1907	270,000
May 27, 1908	100,000
March 4, 1909	230,000
June 25, 1910	150,000
	1,300,000

CONTRACTS IN FORCE.

Name of contractor: Sheridan-Kirk Contract Company.

Amount and character of work: $796,152.70; construction of Lock and Dam No. 37, Ohio River.

Price per unit, original contract: Cofferdam 14 feet wide, $19.41 per linear foot; cofferdam 18 feet wide, $20.45 per linear foot; cofferdam 20 feet wide, $21.68 per linear foot; temporary piling, $15 per pile; crib timbers, $42 per 1,000 feet b. m.; clearing land, $150 per acre; ordinary excavation, $0.50 per cubic yard; deposit excavation, $0.65 per cubic yard; rock excavation, $2 per cubic yard; channel dredging, $0.10 per cubic yard; ordinary filling, $0.30 per cubic yard; stone filling, $2.50 per cubic yard; slope walls (dry stone), $3 per cubic yard; concrete masonry,[a] $4.29 per cubic yard; brick paving,[a] $1.34 per square yard; roadways, $1.20 per square yard: combination gutter curb,[a] $1 per linear foot; open gutters,[a] $0.70 per linear foot; catch basins,[a] $30 each; manholes,[a] $60 each; sewers,[a] $1.20 per linear foot; oak timber, $72 per 1,000 feet b. m.; pine timber, white, $80 per 1,000 feet b. m.; cast iron, $0.045 per pound; wrought iron and steel, $0.06 per pound; steel castings, $0.09 per pound; bronze, $0.21 per pound; Babbitt metal, $0.15 per pound; yellow-pine timber, $54 per 1,000 feet b. m.; iron pipe, 3-inch diameter, $0.24 per linear foot; iron pipe, 4-inch diameter, $0.40 per linear foot; iron pipe, 6-inch diameter, $0.56 per linear foot; iron pipe, 8-inch diameter, $1.50 per linear foot; valves, 4-inch, $4.50 each; crosses, 4-inch, $1.75 each; tees, 4-inch, $0.70 each; elbows, 4-inch, $0.45 each; brass pipe, $0.40 per pound. Supplemental contracts: Wrought iron and steel, steel castings, cast iron (weights, blocks, and anchors), cast iron (air pipes, flanges, faced), and steel springs, $0.0785 per pound; bronze (nuts, plugs, and bushings), brass pipes (cast), copper (gaskets, for joints), Babbitt metal (packing rings), $0.60 per pound; 4-inch gate valves (iron, brass mounted), $6.80 each; 6-inch wrought-iron pipe, $0.95 per linear foot; 4-inch wrought-iron pipe, $0.63 per linear foot; 4-inch elbows (screw ends), $1.48 each; 4-inch recessed couplings, $1.28 each; cutting and threading bolts, $0.15 each; white-oak timber (dressed and fitted), $72 per 1,000 feet b. m.; white-pine timber (dressed and fitted), $80 per 1,000 feet b. m.; excavation, $0.40 per cubic yard; earth embankment, $8.70 per linear foot; concrete facing, 8 inches thick, laid on a backing of gravel 13 inches thick, $2.90 per cubic yard.

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[a] Cement to be furnished by the United States.

Dates of approval: Original contract, November 17, 1904; supplemental contracts, June 28, 1907, October 16, 1908, and May 12, 1910.

Date of beginning: Thirty days after notification of approval of contract.

Date of expiration: Three hundred and fifty fair working days after date of commencement. Time limit waived.

Name of contractor: The M. Marcus Building Company.

Amount and character of work: $6,947. Building warehouse at Dam No. 37, Ohio River.

Date of approval: January 7, 1909.

Date of beginning: Thirty days after date of notification of approval of contract.

Date of expiration: September 11, 1909. Completed.

Name of contractor: Kaps & Brehm.

Amount and character of work: $12,200. Building power house at Dam No. 37, Ohio River.

Price per unit: $12,200.

Date of approval: February 10, 1909.

Date of beginning: Thirty days after date of notification of approval of contract.

Date of expiration: October 24, 1909. Completed.

Name of contractor: The Superior Portland Cement Company.

Amount and character of work: $17,250. Cement for Dam No. 37, Ohio River.

Price per unit: $1.15 per barrel.

Date of approval: October 7, 1909.

Date of beginning: October 14, 1909.

Date of expiration: Contingent on progress of work. Contract annulled.

Name of contractor: The Lehigh Portland Cement Company.

Amount and character of work: $6,030. Cement for Dam No. 37, Ohio River.

Price per unit: $1.34 per barrel.

Emergency contract dated November 11, 1909.

Date of beginning: November 17, 1909.

Date of expiration: Contingent on progress of work. Completed.

Name of contractor: The Ironton Portland Cement Company.

Amount and character of work: $11,004. Cement for Dam No. 37, Ohio River.

Price per unit: $1.31 per barrel.

Emergency contract dated November 27, 1909.

Date of beginning: December 6, 1909.

Date of expiration: Contingent on progress of work.

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[a] Cement to be furnished by the United States.

Name of contractor: G. & W. Manufacturing Company.

Amount and character of work: $29,533.26. Furnishing and installing operating machinery at Dam No. 37, Ohio River.

Price per unit:

Straight-line air compressors	$1,800.00
Turbo-generator	1,690.00
Air receivers	240.00
Water-tube boilers	2,600.00
Feed-water heater	300.00
Feed-water pump	175.00
Drainage receiver	80.00
Injectors	30.00
Duplex winding engines	800.00
Air jacks	200.00
Winches for flushing conduits	300.00
Standard lap-welded wrought-iron pipe, per linear foot:	
8-inch	2.75
6-inch	2.00
5-inch	1.50
4½-inch	1.50
4-inch	1.00
3-inch	.75
2½-inch	.75
2-inch	.50
1½-inch	.50
1¼-inch	.40
1-inch	.40
¾-inch	.40
Pipe bends, 4-inch	2.00
Wrought-iron dredge chain:	
¾-inch	.60
½-inch	.40
Wrought-iron straight link chain, ¼-inch	.20
Brass whistle chain, 3/16-inch	.40
Pipe coverings, per linear foot, for—	
8-inch pipe	.70
6-inch pipe	.60
5-inch pipe	.50
4½-inch pipe	.50
4-inch pipe	.50
2-inch pipe	.24
1¼-inch pipe	.22
1-inch pipe	.20
Boiler drum, etc., per square foot	.60
Pipe fittings, number:	
8-inch	1.50
6-inch	1.00
5-inch	.90
4½-inch	.90
4-inch	.70
2-inch	.50
1¼-inch	.50
1-inch	.60
Gate valves:	
8-inch	65.00
6-inch	45.00
4-inch	25.00
Globe valve (water cut-off), 3-inch	8.00
Globe valves:	
2½-inch	6.00
2-inch	4.50
1¼-inch	2.00
1-inch	1.50
¾-inch	1.20
Whistle valve, 1-inch	7.00
Check valves, 1-inch	3.50
Blow-off valves (Duro), 1½-inch	10.00

Angle safety valves, 4-inch	$35.00
Floor stand, 4-inch	25.00
Floor stand, 8-inch	30.00
Stop and waste cock, 1¼-inch	5.00
Gauge cock, 3-ball	1.00
Steam cocks (brass), 1½-inch	5.00
Drip cock, 1½-inch	2.50
Drip cock, 1-inch	2.50
Hose connection, with cap, 2½-inch	14.00
Hose connection, with cap, ¾-inch	2.50
Water gauges, automatic, 3-rod, glass tube	11.00
Air-pressure gauge, 12-inch dial	20.00
Air-pressure gauge, 8-inch dial	9.00
Steam-pressure gauge, 12-inch dial	20.00
Steam-pressure gauge, 8-inch dial	9.00
Water-pressure gauge, 6-inch dial	5.00
Steam whistle	12.00
Turn-buckles, ¾-inch	.75
Malleable iron caps, 3-inch	.50
Exhaust head	50.00
Saddle nozzle, 6-inch (cast steel) steam pipe	8.00
Saddle nozzles, 4-inch (cast steel)	7.00
Saddle flange, screw, 2½-inch, forged steel	5.00
2-inch	5.00
1-inch	5.00
Wrenches for water-supply cut-off valves	4.00
Brass gong, 13-inch diameter	12.00
Brass gong, 6-inch diameter	4.00
Steel forgings, per pound	.05905
Steel castings, per pound	.13
Medium steel, per pound	.12
Tool steel (keys), per pound	.65
Wrought-iron forgings, per pound	.10
Iron castings (except pipe elbows), per pound	.07
Iron castings (special elbow pipe), per pound	.07
Brass composition castings, per pound	.50
Babbitt metal, per pound	.22
Sheet-iron spiral pipe, galvanized (No. 12 B. W. G.) per pound	.25
Sheet-iron spiral pipe, galvanized, with 4 elbows (No. 14 B. W. G.), per pound	.20
Sheet iron, black, No. 10, for dampers, per pound	.11
Black iron pipe with 2 elbows (10 U. S. W. G.), per pound	.11
Sheet iron, galvanized (No. 14 B. W. G.), per pound	.20
Copper (No. 14 B. & S. G.)	.70
Copper gaskets, corrugated	.75
Cast-iron elbows, long radius:	
8-inch	18.75
8-inch, round base	15.00
6-inch	10.40
5-inch	9.00
4½-inch	8.00
4-inch	7.00
Cast-iron elbows, standard, 3-inch	4.00
Cast-iron reducing elbows, 8 to 6 inch	20.00
Cast-iron reducing elbows, 4 to 3 inch	8.00
Malleable-iron elbows, long radius:	
2½-inch	1.50
2-inch	1.00
1½-inch	.80
1¼-inch	.50
1-inch	.50
¾-inch	.50
¾-inch, 45°	.50

Cast-iron tees, long radius:	
8 by 8 by 8 inch	$15.00
8 by 8 by 6 inch	19.00
8 by 8 by 4 inch	19.00
8 by 8 by 1¼ inch	18.00
5 by 6 by 8 inch	18.00
4½ by 6 by 5 inch	10.00
4 by 4 by 8 inch	18.00
4 by 4 by 6 inch	10.00
3 by 3 by 3 inch	4.00
Cast-iron tees:	
3 by 3 by 1½ inch	2.50
3 by 1¼ by 3 inch	2.50
Malleable-iron tees, long radius, number:	
2½ by 2½ by 2½ inch	2.00
2½ by 1¼ by 2½ inch	2.00
1¼ by 1¼ by 1¼ inch	.95
1¼ by 1¼ by 1 inch	.95
¾ by ¾ by 1¼ inch	.95
¾ by ¾ by ¾ inch	.70
Cast-iron cross, 3 by 2½ by 2½ by 1¼ inch	4.00
Brass unions:	
2½-inch	3.00
2-inch	2.00
1½-inch	1.40
1¼-inch	1.00
1-inch	.75
¾-inch	.60
Cast-iron flanges:	
8-inch	2.00
6-inch	1.50
5-inch	1.40
4½-inch	1.20
4-inch	1.00

Date of approval: January 29, 1910.
Date of beginning: Ten days after date of receipt of notice to begin.
Date of expiration: To be completed within one hundred and fifty fair working days after expiration of said ten days.

Name of contractor: Des Moines Bridge and Iron Company.
Amount and character of work: $2,488. Steel tower, water tank, etc., water system, Dam No. 37, Ohio River.
Price per unit: $2,488.
Date of approval: April 20, 1910.
Date of beginning: May 5, 1910.
Date of expiration: September 5, 1910.

Name of contractor: James Kinney, jr.
Amount and character of work: $1,320. Drilling well, water system, Dam No. 37, Ohio River.
Price per unit: $1,320.
Date of approval: April 20, 1910.
Date of beginning: May 6, 1910.
Date of expiration: September 6, 1910.

Name of contractor: The Wm. T. Johnston Company.
Amount and character of work: $1,454.46. Material, water system, Dam No. 37, Ohio River.
Price per unit:

Standard lap-welded wrought-iron pipe, per linear foot:	
4-inch	$0.90
2-inch	.30
1¼-inch	.18

Cast-iron pipe, per linear foot:	
4-inch	$0.40
3-inch	.35
Fire hydrants, 4-inch inlet (2), 2½-inch nozzle	29.90
Gate valves:	
4-inch	18.90
3-inch	9.40
Extension valve and roadway boxes:	
For 4-inch valve	11.90
For 3-inch valve	10.90
Cast-iron elbows:	
90°, 4-inch, long radius	3.15
45°, 4-inch, long radius	3.15
Reducing 5 by 4 inch, long radius	5.90
Malleable-iron elbows:	
2-inch, long radius	.72
1¼-inch, long radius	.40
Cast-iron tees:	
4 by 4 by 4 inch, long radius	3.15
4 by 4 by 3 inch, long radius	3.15
Malleable-iron tees, 1¼ by 2 by 1¼ inch, long radius	.80
Brass unions, 1¼-inch	.75
Corporation stop cocks:	
1½-inch	5.00
1¼-inch	4.00
Cast-iron flanges, 4-inch	1.00
Brass globe valves:	
2-inch	6.00
1¼-inch	2.75
Detachable reducing hose connections	2.50

Date of approval: April 28, 1910.
Date of beginning: May 2, 1910.
Date of expiration: June 25, 1910.

Name of contractor: The Monongahela River Consolidated Coal and Coke Company.
Amount and character of work: $2,311. Constructing hull of maneuver boat.
Price per unit: $2,311.
Date of approval: June 8, 1910.
Date of beginning: Ten days after receipt of notice of approval of contract.
Date of expiration: September 14, 1910.

Name of contractor: Sheridan-Kirk Contract Company.
Amount and character of work: $502.65. Fitting and connecting pipe, etc.
Price per unit: $502.65.
Emergency contract dated June 8, 1910.
Date of beginning: Ten days after receipt of notice to begin.
Date of expiration: October 5, 1910.

DD 3.

OPERATING SNAG BOATS ON THE OHIO RIVER BELOW THE PENNSYLVANIA STATE LINE.

The act of Congress of September 19, 1890, as modified by that of June 3, 1896, provided for yearly appropriations of $50,000 for this work. For phraseology of these acts and further details, see the Annual Report for 1896, Part 4, page 2093.

The work performed under this appropriation consists in the removal of snags, wrecks, rocks, and similar obstructions to navigation.

During the past fiscal year the snag boat operated over the river from the Pennsylvania state line to the mouth, a distance of 927 miles.

The plant belonging to this work consists of the snag boat *E. A. Woodruff*, fitted with all necessary tools and appliances.

The snag boat was in commission at the commencement of the fiscal year, and except some short intervals required for repairs, or caused by low water, etc., was engaged in her regular work from July 1, 1909, to December 27, 1909. The necessary repairs, including the installation of a refrigerating plant, having been made while the boat was in ordinary use, she resumed her regular work on June 1, 1910, and continued until the close of the fiscal year.

The *E. A. Woodruff* traveled 4,826.5 miles during the fiscal year, and removed the following obstructions: 1,146 snags, aggregating 5,700.77 tons; 93.75 cords drift; and 29 wrecks, comprising 14 coal barges, 2 model barges, 1 sand barge, 1 tie barge, 4 coal boats, 3 flat boats, 2 mud scows, and the remains of 2 steamboats.

While the snag boat was on the lower Ohio in September, 1909, a hired dredging plant was employed under this appropriation, and removed 7 snags from the Ohio River near the mouth of the Little Miami River, which were obstructing navigation.

List of steamboat wrecks, by name, removed from the Ohio River during the fiscal year ending June 30, 1910, by the U. S. snag boat E. A. Woodruff.

Name.	Location.	Miles below Pittsburg.
Unknown	Dekoven Landing, Ky	859
Burnadina King	Evansville, Ind	784

CONTRACTS IN FORCE.

Name of contractor: Sheridan-Kirk Contract Company.
Amount and character of work: $56.25. Hire of plant for removing snags in Ohio River.
Price per unit: $45 per day of ten hours; over ten hours, one-tenth of the contract price per day for each hour employed.
Emergency contract dated September 3, 1909.
Date of beginning: September 4, 1909.
Date of expiration: September 4, 1909. Completed.

Name of contractor: Columbia Iron Works.
Amount and character of work: $623. Repairing deck of U. S. snag boat *E. A. Woodruff.*
Price per unit: $623.
Emergency contract dated March 8, 1910.
Date of beginning: March 15, 1910.
Date of expiration: May 17, 1910. Completed.

Name of contractor: The Triumph Electric Company.
Amount and character of work: $2,350. Refrigerating plant for U. S. snag boat *E. A. Woodruff.*
Price per unit: $2,350.
Emergency contract dated March 12, 1910.
Date of beginning: April 21, 1910.
Date of expiration: May 23, 1910.

Summary of expenditures for operating snag boats on the Ohio River for the fiscal year ending June 30, 1910.

Office expenses and superintendence	$1,800.00
Service	18,578.25
Subsistence	4,181.51
Fuel	1,986.62
Explosives, etc	271.65
General supplies and expenses	2,267.40
Care and repair of plant	1,425.96
Additions to plant	2,350.00
Hire of plant	56.25
Total	32,917.64

APPENDIX E E.

IMPROVEMENT OF RIVERS AND HARBORS IN THE PITTSBURG, PENNSYLVANIA, DISTRICT.

REPORT OF LIEUT. COL. H. C. NEWCOMER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Monongahela River, West Virginia.
2. Monongahela River, Pennsylvania.
3. Operating and care of locks and dams, Monongahela River, West Virginia and Pennsylvania.
4. Allegheny River, Pennsylvania, open-channel work.
5. Allegheny River, Pennsylvania, construction of locks and dams.
6. Operating and care of locks and dams, Allegheny River, Pennsylvania.
7. Ohio River, Pennsylvania.
8. Dredging Ohio River, Pennsylvania.
9. Operating snag boats on the Ohio River, Pennsylvania.
10. Operating and care of locks and dams, Ohio River, Pennsylvania.
11. Harbor at Pittsburg, Pennsylvania.
12. Youghiogheny River, Pennsylvania.

United States Engineer Office,
Pittsburg, Pa., July 16, 1910.

Sir: I have the honor to forward herewith annual reports of works under my charge for the year ending June 30, 1910.

Very respectfully, your obedient servant,

H. C. Newcomer,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, U. S. Army.

E E 1.

IMPROVEMENT OF MONONGAHELA RIVER, WEST VIRGINIA.

Lock and Dam 12.—In November and December, 1909, the crew of the U. S. repair steamer *Slackwater* built an addition to the abutment. The concrete core wall was raised to an elevation 5 feet higher than the lock walls, and joined to a concrete wall of the same height built across the end of the dam, using in all 85 cubic yards of concrete.

Lock and Dam 13.—The crew of the repair steamer *Slackwater* in November, 1909, built a crib base for concrete guide wall at upper entrance to the lock, and sank same to position, filling it with 313 cubic yards of stone. The guide wall is 100 feet long. The concrete superstructure was also built, using 181 cubic yards of concrete. The crib required 6,500 feet b. m. of timber. U. S. dredge boat *No. 2* removed 1,305 cubic yards of material preparatory to the sinking of the crib, and backfilled 510 cubic yards behind the completed wall.

APPROPRIATIONS.

For previous project (see H. Doc. 421, 57th Cong., 2d sess., p. 350)		$432,900.00
September 25, 1889 (allotted from examinations, surveys, and contingencies of rivers and harbors)		4,000.00
		436,900.00
For present project:		
July 13, 1892, improving Monongahela River, West Virginia		25,000.00
August 18, 1894, improving Monongahela River, West Virginia and Pennsylvania		20,000.00
June 3, 1896, improving upper Monongahela River, West Virginia		30,000.00
June 4, 1897, improving upper Monongahela River, West Virginia		350,000.00
July 1, 1898, improving upper Monongahela River, West Virginia		400,000.00
June 28, 1902, improving Monongahela River, West Virginia		350,000.00
April 28, 1904, improving Monongahela River, West Virginia		100,000.00
Received from other sources:		
On bond of failing contractor	$107,463.86	
Sale of condemned property	21.64	
		107,485.50
		1,819,385.50
Less amount carried to surplus fund		1,392.35
Total for both projects		1,817,993.15

COMMERCIAL STATISTICS.

Traffic through Locks 9–15, inclusive, for the calendar year 1909, as measured by the commerce through Lock 9.

Freight	tons (2,000 pounds)	52,589
Passengers	number	13,370

EE 2.

IMPROVEMENT OF MONONGAHELA RIVER, PENNSYLVANIA.

REBUILDING LOCK AND DAM 5.

This work was in local charge of First Lieut. L. M. Adams, Corps of Engineers, to January 17, 1910, and of Junior Engineer W. D. Fairchild to the close of the year.

Lock.—Under contract with H. E. Talbott & Co., of Dayton, Ohio, the following work on construction of the lock was done:

Item.	Designation.	Quantities.	Price per unit.
Concrete placed	Cubic yards	1,361.4	$6.50
Iron placed	Pounds	3,130.0	.02
Earth removed	Cubic yards	472.8	.50
Rock removed	.....do	1.4	2.00
Back fill placed	.....do	3,483.6	.30

The total quantities under this contract were:

Item.	Designation.	Quantities.	Price per unit.
Earth excavation	Cubic yards	56,270.2	$0.50
Rock excavation	.....do	545.8	2.00
Back fill	.....do	17,660.0	.30
Concrete	.....do	55,916.5	6.50
Piles	Linear feet	12,194.7	.50
Placing of metal	Pounds	35,043.5	.02

In addition to the above, the total amount paid to the contractors for shoring, etc., amounted to $32,484.29, estimated on the basis of cost plus 15 per cent.

The placing of the concrete was completed July 11, 1909, and the contractors began dismantling the gantry cranes and removing the cofferdam. The United States removed the piling and all material in the land chamber to elevation of lower sill. The contractors completed all the backfilling except that part behind the upper guide wall, which is to be done by the United States. In August, 1909, the contractors completed the removal of the plant. On account of accidents and the slow progress made (two pile drivers being sunk in pulling piles on the lower arm of the cofferdam, and no attempt being made to continue the removal of the coffer), the United States on August 18 began removing the cofferdam. The expense of such removal was charged to the contractors.

This work was begun September 3 and was completed October 20. The dredge pile driver and steamer *T. P. Roberts* were employed in connection therewith, and the coffer was removed to a depth of 7 feet below pool level in order to facilitate the handling of fleet during construction work on the dam. The following expense was incurred:

Dredging 10,200 cubic yards	$875.61
Round piles pulled, 457	289.09
Removing runway	120.00
Total	1,284.70

This amount was retained from the retained percentage.

A total of 53,874 barrels of cement was used in the construction of the lock.

Under contract with the Pittsburgh Bridge and Iron Works, of Rochester, Pa., dated April 10, 1909, the following work was accomplished:

The river chamber was unwatered on September 15, 1909, and the contractor began the erection of the upper gates. Some delay in progress of gate erection was caused by the late arrival of gate anchorages and the rejection of a number of pieces after their delivery. The erection of the gates in the river chamber was completed and as the contractor made no provision to fit and bolt on the quoin and miter posts as contemplated in the specifications the United States did this work, the expense therefor being charged to the contractor.

In October the contractor completed the erection, riveting, and painting of all the gates except the permanent short upper gates for the river chamber, which gates were riveted and painted and left behind the land wall opposite the upper gate recess. It was not deemed advisable to install the quoin and toe posts in these gates at this time, as much deterioration might result, and the of cost of such final installation was estimated from the work already done and deducted from the contractor's estimate. On account of the delay in receiving the quoin and miter posts the work on the gates erected was not completed until December 17.

The following work was done by hired labor: Drain holes were drilled in all horizontal I-beam panels, guard pieces for protecting valve rods were fitted and bolted in place, all valve rods and chains were fitted and installed, 7-inch bumping blocks for all gates were set and spiked to wooden plugs sunk into the concrete back of each gate, and the gates reenforced on the open side with a diagonal strap fitted with a heavy turn-buckle. This strap was designed to take up the warp in the gates, and on being riveted in place the gate was adjusted to a nicety.

A concrete powerhouse, one story high, 12 feet wide by 60 feet long, was built on the river wall over the turbine wells.

Under contract with the Hall Steam Pump Company, of Pittsburg, Pa., the installation of the duplicate set of turbines and air compressors was completed in February, and on account of the impossibility of testing the plant a supplemental contract was entered into providing for the payment of 80 per cent of the contract price, the final payment being made later when there was sufficient head of water to test the plant. All piping in the power house was done by hired labor.

All the machinery for operating gates, gate wickets, cylindrical and butterfly valves was installed and the machinery pits covered with plank. The piping to all the air engines from the power house was completed. Screens were placed over all openings to the valves. Steel piles were removed from the upper and lower core walls and inner lock chamber.

The United States dredge *No. 1* dredged the upper and lower approaches to the lock, placed and removed earth cofferdams at the upper and lower ends of the land and river chambers, and assisted in unwatering the coffers. The coffer around the lock was dredged at the contractors' expense. The river chamber was dredged to 2 feet below sill level. The crew of the dredge was also employed in pipe fitting and on the installation of machinery. All the round piles in the land chamber were removed by the U. S. steamer *Swan* and dredge *No. 2*.

The river lock was placed in operation in December, 1909.

Dam.—At the beginning of the fiscal year work was continued on the north 225-foot section of dam. The remaining Wakefield piles, 6 by 12-inch waling, and sheet piling were placed and concreting begun on July 18. This section was completed to elevation 747.1 in August, except four 25-foot monoliths which were left at elevation 727.1 for use as a spillway.

Work was started on the 100-foot 16 by 30-foot crib apron for the southern 100-foot section of dam, and it was the intention to close the total remaining 330-foot section if the lock was placed in operation; but on account of delay in erection of gates this was found to be impossible, and the 100-foot crib was sunk and concrete work for same length of dam completed to elevation 747.1 in November. Derrick stone from the old railroad bridge piers at Coal Center was used to sink the crib, the stone being afterwards removed for use in the middle section of dam. The filling stone was furnished by J. S. Ely & Son, of Point Marion, Pa.

Work on the middle section of dam was started in November. Dredging for the crib was completed; 144 round piles and 70 Wakefield piles were driven; and 1,370 yards of riprap stone, furnished by J. S. Ely & Son, were on hand. Nine courses of the final crib section were built and ready to sink when work had to be suspended on account of frequent rises in the river, which not only prevented any work on the dam, but also caused considerable scour, washing out 58 round piles and 27 Wakefield sheet piles.

On account of freezing of the stone in flats, continued high water, and expense of holding flats, all stone was unloaded behind the lower guide wall and the flats were released to the owners.

Work on the middle section of the dam was resumed in April and concreting started in May. Work was again suspended from June 2 to 26, inclusive, on account of high water. On June 30 the middle section of concrete was completed to elevation 737.1.

Present condition of dam.—Southerly 100-foot section is completed; middle 230-foot section is completed to elevation 737.1; and north 225-foot section to elevation 747.1, except four monoliths, brought to elevation 737.1 for use as a spillway.

During the year the United States hired labor force did the following work on the dam:

Item.	Designation.	Quantities.
Concrete placed	Cubic yards	4,977.00
Stone placed	do	8,718.12
Round piles driven	Number	619
Wakefield piles driven	do	484
Sheeting, 4 by 12 inches	Linear feet	514
Waling, 6 by 12 inches	do	1,409

Abutment.—The slope above the abutment wall and between the core walls was paved during July and August with riprap stone 18 inches deep, backed with blast-furnace cinder. The stone was obtained from the old railroad bridge piers at Coal Center, split and hammer dressed. Five hundred and sixty-nine yards of paving were placed, at a cost of $1.93 per square yard.

APPROPRIATIONS.

For previous project (see H. Doc. 421, 57th Cong., 2d sess., p. 351)		$3,771,916.82
Less amount carried to surplus fund		2,842.94
		3,769,073.88
For present project:		
March 3, 1899, improving Locks Nos. 3 and 6 and for floating plant		50,000.00
June 6, 1900, completing improvement at Locks Nos. 3 and 6 and for floating plant		135,556.00
June 13, 1902, rebuilding Lock and Dam No. 2		200,000.00
March 3, 1903, rebuilding Lock and Dam No. 2		455,961.00
March 3, 1905, certain improvements at Locks and Dams Nos. 5 and 6		7,850.00
March 3, 1905, rebuilding Lock and Dam No. 3		200,000.00
June 30, 1906, rebuilding Lock and Dam No. 3		389,196.90
March 2, 1907, rebuilding Lock and Dam No. 5		256,042.00
May 27, 1908, rebuilding Lock and Dam No. 5		300,000.00
March 4, 1909, rebuilding Lock and Dam No. 5		200,000.00
June 25, 1910, completing reconstruction of Lock and Dam No. 2		43,000.00
Received from other sources—		
Sales of condemned property	$899.35	
Sales of blueprints	4.45	
		903.80
Total for both projects		6,007,582.68

CONTRACTS IN FORCE.

BUILDING A LOCK WITH TWO CHAMBERS, TWO GUIDE WALLS, AND TWO GUARD WALLS, AT BROWNSVILLE, PA., MONONGAHELA RIVER (NEW LOCK 5).

Contractors: H. E. Talbott & Co., Dayton, Ohio.

Rates: Earth excavation, 50 cents per cubic yard; rock excavation, $2 per cubic yard; rock fill, 30 cents per cubic yard; concrete, $6.50 per cubic yard; piles, 50 cents per linear foot; sheet piles and wales, $60 per M feet b. m.; pile shoes, 5 cents per pound; stone ballast, $2 per ton of 2,000 pounds; shoring to prevent slides, cost plus 15 per cent.

Date of approval: September 28, 1907.

Date of beginning work: October 20, 1907.

Date of expiration: September 30, 1909.

FURNISHING AND DELIVERING LOCK-OPERATING MACHINERY FOR LOCK 5, AT BROWNSVILLE, PA., ON THE MONONGAHELA RIVER.

Contractor: J. and J. B. Milholland Company, Pittsburg, Pa.

Rate: $14,938.66.

Date of approval: April 26, 1909.

Date of beginning work: May 23, 1909.

Date of expiration: November 23, 1909.

FURNISHING, DELIVERING, AND ERECTING FIVE PAIRS OF STEEL LOCK GATES FOR LOCK 5, AT BROWNSVILLE, PA., ON THE MONONGAHELA RIVER.

Contractor: Pittsburgh Bridge and Iron Works, Rochester, Pa.

Rate: $20,894.

Date of approval: April 27, 1909.

Date of beginning work: May 23, 1909.

Date of expiration: January 5, 1910 (extended for a reasonable period).

FOR FURNISHING AND INSTALLING A WATER-POWER AIR-COMPRESSOR PLANT AT LOCK 5, MONONGAHELA RIVER, BROWNSVILLE, PA.

Contractor: Hall Steam Pump Company, Pittsburg, Pa.
Rate: $5,120.
Dates of approval: Original contract, August 17, 1909; supplemental contract (providing for change in method of payment), March 4, 1910.
Date of beginning work: August 31, 1909.
Date of expiration: November 21, 1909 (extended for a reasonable period).

E E 3.

OPERATING AND CARE OF LOCKS AND DAMS, MONONGAHELA RIVER, WEST VIRGINIA AND PENNSYLVANIA.

Assistant Engineer T. P. Roberts continued in charge of Locks and Dams 1 to 6 during the fiscal year, and Assistant Engineer J. L. Callard of Nos. 7 to 15.

RECONSTRUCTION OF LOCK AND DAM 1.

Operations connected with the construction of the new lock were actively prosecuted throughout the year. A start was also made in placing of concrete top on the old timber dam extending across the river. There being a double lock at this place, the small outer chamber was first selected for demolition, leaving the inshore chamber to accommodate the river traffic. Work on a cofferdam, 1,021 feet long, inclosing the outer lock, was started on July 15, and while it was underway the portion of the river wall of the old lock above lower pool level was removed by boats. The cofferdam was pumped out for the first time on September 21, and on the 29th of the same month work on the first monolith of the new river wall was started. While a comparatively smooth rock bottom exists at 9 to 11 feet below lower pool level, the old lock was built on a course of pine timber 12 by 12 inches laid transversely to the chamber, covered with a course of plank. In removing the plank there was discovered, about the middle of the lock, an old timber bear trap beneath it with its upper leaf 50 feet wide by 31 feet overlapping a lower leaf 50 by 20 feet, both leaves being 13 inches thick and formed of three courses of heavy plank bolted together. The bear trap was placed in the lock when it was built in 1839.

In the removal of the timber foundations and the bear trap about 200,000 feet b. m. of serviceable crib material was obtained. During the construction of the new outer lock the cofferdam was submerged on eight different occasions, at times interfering to a considerable extent with the work and involving the removal of considerable quantities of mud and ice. Work on the erection of the steel gates for the new lock was started in the middle of March and the lock was opened to navigation on June 6. The compressed-air machinery for operating the lock gates, filling and emptying valves, are working very satisfactorily. The available dimensions of the new chamber are the same as those of the new locks at Dams 2, 3, and 5, viz, 56 by 360 feet. The normal lift of the new lock is about 4 feet, but may be 10 feet at occasional times when the Davis Island dam on the Ohio River is down during the winter, and with the proposed adjustable top on Dam 1 raised to its limit of 3 feet.

The following statement embraces the principal items of work involved in the construction of the new outer lock:

Summary of concrete work—cubic yards.

Wall.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Total.
River	172.03	1,798.51	1,199.50	2,441.75			5,611.79
Middle		937.41	2,331.20	1,558.25	232.64	312.00	5,371.50
Guard		289.52	147.50	87.03			524.05
Upper head			150.60				150.60
Upper miter				121.58			121.58
Lower head						47.01	47.01
Lower miter				82.45			82.45
Total	172.03	3,025.44	3,828.80	4,291.06	232.64	359.01	11,908.98

Two hundred and seventy thousand feet b. m. timber and plank were used in the construction of the cofferdam and about 13,600 cubic yards of dredged material were used for filling it. About 2,806 cubic yards of masonry of river wall of old lock were removed. It was not necessary to disturb the other old wall although its demolition for the greater part will become necessary in building the new inshore lock, work upon which, as noted below, was commenced in June. About 600 cubic yards of rock bottom was removed in the construction of the new outer lock, in leveling the chamber floor and in preparing foundations for miter and head walls. Several thousand yards of mud and débris overlying the rock outside the limits of the old lock were also removed. Nearly three-quarters of the first cofferdam, or 700 linear feet, had been removed by the dredge boat up to the end of June.

Operations in connection with the construction of the new inner lock were commenced about June 1, but a series of rises, one of which submerged the old lock walls, interfered considerably with the work. At the end of June work was in progress on the construction of two short cofferdams extending from the middle wall of the new outer lock to the shore from its upper and lower ends. Meantime progress was being made in the demolition of the old middle wall, removal of old lock-gate machinery, etc.

A line of piles, about 250 feet long, was driven in May above the fixed dam and partly sheeted, but a sudden rise of 10 feet from the extreme headwaters, where the storm and floods were very disastrous, carried away a portion of the work, while two loaded coal boats of 1,000 tons each, which were carried over the dam on June 20, destroyed other portions of the pile work.

The power house on Second avenue, work upon which was noted in last annual report, was completed and placed under roof in November, and by the end of March two air-compressing engines, with four receivers for compressed air, were installed. The compressors are of the Peerless type, two stage, and were furnished by the American Compressor and Pump Company, of Baltimore, Md., having steam cylinders of $10\frac{1}{2}$-inch stroke, 10-inch diameter, which, at 125 revolutions per minute compress 320 cubic feet of free air per minute. The four cylindrical tanks, or air receivers, have each a capacity of 262 cubic feet. The maximum working pressure will be 100 pounds per square inch. In the foundation, floors, and walls of the power house, 550 cubic yards of concrete were used, and 59,500 brick. Its total cost was $9,000. The area of the building is 48 by 53 feet. The engine-room floor is about 17 feet above the lock walls, or approximately at the elevation of the flood of March, 1907, the highest known in Pittsburg.

A guard crib above the upper end of the river wall was built and filled with ballast stone. Its dimensions are as follows: Length, 90 feet; base width, 16 feet; top width, 12 feet; height, 26 feet.

All the work at Lock 1 is being done by hired labor. The cost of concrete work in the lock walls, using Ransome mixers, including Universal cement, gravel and sand, labor and material for forms, pumping during periods when concrete was being placed, ranged during the several months from about $3.25 to $3.75 per cubic yard. Excavation and cost of cofferdam and removal of old lock are not included in this unit cost.

The total amount expended during the year on this work was $173,364.81.

On April 26, 1910, an additional allotment of $80,000 was made to complete the reconstruction of this lock and build concrete top on old timber dam.

OPERATING AND CARE.

In addition to the routine duties of operation and care, the following special items of work are noted:

Lock and Dam 1, Pittsburg, Pa.—The old outer lock was finally closed to navigation on July 14, preparatory to its demolition and reconstruction on enlarged lines. It had been in constant service, excepting when closed for repairs, for a period of over sixty-nine years. During the rest of the year the traffic was confined to the use of the inner lock, the available dimensions of which are 215 by 56 feet. Fortunately, there were no serious accidents interfering with the operation of the inner lock, which at times was in use night and day to the utmost of its capacity. The new outer lock was completed and opened to the river traffic on June 6.

Lock and Dam 2, Braddock, Pa., 11.2 miles above mouth of river.—During the year the outer lock was closed twenty-six days on account of repairs to two of the large valves, and the inside lock forty-nine days for repairs to two of its valves. As only one chamber was closed at a time, however, there was practically no interruption to the traffic. It was found that a great many rivet heads were entirely consumed by the acid in the river water and the steel plates deeply pitted and worn quite thin in places, while other parts of the same plates, not exposed so much to powerful currents, were but little affected. It is clearly the case that the velocity of the current affords an index to the amount of damage done in a given time to the steel exposed to its action. The surface of rivet heads, projecting as they did in these cases into swifter water, encountered more acid in a given time and consequently wasted to a greater extent. New angles and new rivets were supplied, which should make the valves last two or three years with existing river conditions. A special report on the pollution of the river with acid from mines and factories is being prepared in this office.

A number of drums on the dam seem also to have been damaged by acid water and floods, and will need to be thoroughly overhauled during the summer and fall.

Two brick dwellings, each 29 feet 4 inches by 31 feet 4 inches, were built for employees during the summer and fall. A concrete wall 170 feet long, 10 feet high, extending to near the high-water line, was built to protect the new dwellings from floods. The wall contains about 400 cubic yards of concrete.

A loaded coal flat, which sank in one of the locks on December 21, was raised and removed after thirty-nine hours' work.

United States dredge *No. 2* was employed five days in March clearing the approach below the lock of deposits of silt, and eleven days in March at the mouth of Turtle Creek, about 500 yards above the lock, removing from the latter place 7,470 cubic yards of material which had been pushed out by the creek during floods into the steamboat channel, which at this place passes close to the shore.

Lock and Dam 3, Elizabeth, Pa. (23.8 miles above mouth of river).—The air compressors, lock gates, and valve machinery worked satisfactorily throughout the year, requiring only ordinary repairs. The drums forming the adjustable top on the dam were raised and lowered, as the stage of the river demanded, without trouble, excepting one drum next to the abutment, which seems not to respond to the compressed air, although it partly rises to position under water pressure from the conduit in the body of the dam. No important repairs to grounds, buildings, or lock walls were necessary during the year.

Lock and Dam 4, North Charleroi, Pa. (41.2 miles above mouth of river).—During July and August repairs were made to the upper and lower miter sills of the inshore lock, new buffer irons being placed on the sills. The journals of the wickets in the gates were also renewed and new acorns or pintles supplied.

Lock and Dam 5 (58.9 miles above mouth of river).—While the new dam at No. 5 is under construction vessels are passed through both the new, as well as the old, locks, the lift being divided between the two sets of locks, which are more than a mile apart. This arrangement will continue for most of the present working season. No repairs of consequence were made to the old lock or its appurtenances.

Lock and Dam 6, Rices Landing, Pa. (68.7 miles above mouth of river).—A cement pavement, 165 feet long, was laid on the street front of the lock property in the village of Rices Landing.

Lock and Dam 7 (82.7 miles above mouth of river).—Approaches to lock were dredged. Walls and ceiling of kitchen of dwelling No. 1 were given three coats of paint and the woodwork two coats.

Lock and Dam 8 (87.5 miles above mouth of river).—Approaches to lock were dredged. Sheeting of dam was repaired. About 250 linear feet of concrete walk 2 feet wide and 18 linear feet 4 feet wide were laid. New chains and chain sheaves for closing leaves of lower gate and new bolts for attachment of chains for closing leaves of both gates were placed. Old shingle roofs of washhouse and blacksmith shop were replaced with slate.

Lock and Dam 9 (93.2 miles above mouth of river).—Approaches to lock were dredged. About 160 linear feet of concrete walk 2 feet 2 inches wide and 78 linear feet of flagstone walk were laid.

Lock and Dam 10 (102.6 miles above mouth of river).—Approaches to lock were dredged. A ledge of rock across channel about 2,000 feet below lock was removed by blasting and dredging. Both leaves of lower gate were unhung and battens placed around wickets to stop leakage.

Lock and Dam 11 (*105 miles above mouth of river*).—Approaches to lock were dredged. About 17 cubic yards of large stones were placed to protect right bank of river below dam. Mortar facing of dam was repaired. A set of six new pins were placed in right filling valve.

Lock and Dam 12 (*109.8 miles above mouth of river*).—Approaches to lock were dredged. A set of six new pins were placed in one of the filling valves. Two closets in dwelling No. 1 were made into a bathroom, which was equipped with bath tub and lavatory.

Lock and Dam 13 (*111.8 miles above mouth of river*).—Approaches to lock were dredged.

Lock and Dam 14 (*115.5 miles above mouth of river*).—Approaches to lock were dredged. About 600 feet of wire fence were built.

Lock and Dam 15 (*124.1 miles above mouth of river*).—Approaches to lock were dredged.

Boat yard and shops near Lock 4.—The track leading to the river at Fifth street was protected by a short section of concrete retaining wall; several hundred feet of tile pipe were also laid about the buildings to conduct rain water to the river. A large derrick boat, for use on the Ohio River, was built complete at the yard, including cabin, irons for derricks, etc.

Repairs to floating craft, including steamers, dredge boats, scows, and flats, were numerous. Special mention is made of repairs to the steamer *Slackwater*, whose wheel, fantails, and engine on one side were seriously damaged below Lock 6 on the Ohio River by being caught unexpectedly by a swift current forcing the steamer against a guide wall. The machine shop also furnished numerous irons needed at new Locks 1 and 5. During most of the season dredge *No. 1* was in use at new Monongahela River Lock and Dam 5, dredge *No. 2* being much of the time engaged at new Lock 1, Monongahela River. The dredges were tended, respectively, by the snag boat *Swan* and the towboat *T. P. Roberts.*

Miscellaneous.—Fourteen permits for miscellaneous structures in advance of the harbor line were granted. Supervision of work done under these permits, together with work on uncompleted permits granted prior to the fiscal year, was continued throughout the year.

The order of the Secretary of War dated August 10, 1904, requiring certain alterations in the highway bridge crossing the Monongahela River at Brownsville, Pa., on the line of the old national pike was resisted by the bridge owners, the matter being finally carried to the Supreme Court of the United States, which fully sustained the War Department in its action by decision rendered February 21, 1910.

AMOUNTS EXPENDED UNDER ALLOTMENTS FROM ACTS OF JULY 5, 1884, AND MARCH 3, 1909.

Previous allotments (see H. Doc. 421, 57th Cong., 2d sess., p. 351)	$929,454.58
Fiscal year ending June 30—	
1903	238,710.05
1904	292,149.13
1905	234,070.41
1906	249,625.71
1907	242,365.62
1908	257,349.99
1909	241,174.91
1910	364,663.38
Total	**3,049,563.78**

Statement of expenditures for operating and care of locks and dams, Monongahela River, Pennsylvania and West Virginia, during the fiscal year 1910.

Item.	Amount.
Salaries and wages of regular hired labor force	$152,596.33
Miscellaneous supplies and services	19,249.43
Miscellaneous repairs	19,450.81
Total	191,296.57

COMMERCIAL STATISTICS.

Lockages made and traffic passed at Monongahela River locks during the calendar year ending December 31, 1909.

At dam—	Lockages.		Steamboats.		Coal boats, barges, flats, and boat bottoms.		Rafts.	
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
	Number.	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*
1	8,594	8,513	5,696	5,695	15,537	15,570	79	12
2	5,357	5,372	5,519	5,517	19,591	19,668	10	7
3	5,536	5,508	5,550	5,518	22,210	22,075	1	14
4	8,503	8,508	4,558	4,550	17,684	17,951		19
5	2,259	2,285	1,464	1,457	2,401	2,404		21
6	928	958	391	386	730	727	3	24
7	551	571	328	321	239	232		22
8	772	798	482	480	249	227	2	24
9	745	745	520	517	304	295	11	15
10	433	456	199	199	193	198	7	49
11	404	424	166	167	173	179	5	47
12	318	332	153	152	155	155	7	36
13	242	251	126	125	134	125		12
14	252	251	102	101	109	102	1	12
15	357	358	104	106	15	13	1	14
Aggregate	35,251	35,330	25,858	25,291	79,724	79,921	127	328

At dam—	Other craft.		Coal.		Coke.		Rails, steel.	
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
	Number.	*Number.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1	546	538	9,660	3,756,620		150		
2	294	288	21,520	7,206,640	150	50	193	
3	187	135	2,000	9,069,640			375	
4	188	171	828	7,631,760			211	2
5	90	96		714,780		25	520	
6	349	360	996	224,740			500	
7	178	192	739	19,544			400	
8	268	272	347	19,520			400	
9	210	212	628	19,572			400	
10	253	253	718	16,984				
11	224	224	690	16,989				
12	154	152	602	16,973	56		47	
13	120	117	598	17,033				
14	143	144	403	17,063				
15	276	269	82	60				
Aggregate	3,480	3,423	39,811	28,747,918	206	225	3,046	2

Lockages made and traffic passed at Monongahela River locks, etc.—Continued.

At dam—	Other iron or steel products.		Sand.		Gravel.	
	Up.	Down.	Up.	Down.	Up.	Down.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1	96,292	49,043	565,248	39,121	813,789	12,867
2	38,448	25,272	270,480	68,793	488,273	2,070
3	2,607	14,149	61,849	130,348	72,209	23,805
4	2,711	6,720	51,365		62,756	104
5	1,961	275	3,767		10,777	72
6	1,881	269	276		4,995	
7	1,584	79	759		4,527	
8	1,413	133	725	82	5,408	
9	939	162	542	4,630	2,405	
10	622	51	759	242	483	52
11	590	21	276	12	483	4
12	527	16	276	13	483	5
13	576	16	145	6	277	5
14	559	16				
15	305	13				
Aggregate	150,015	96,235	956,467	243,247	1,466,865	38,984

At dam—	Stone.		Brick.		Timber.		Lumber.	
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1	2,095	2,536	8		3,985	1,751	9,333	2,594
2	242	1,949		472	1,266	1,182	11,910	3,160
3	611	1,084	6		589	3,280	2,103	1,911
4	799	4,664	17		192	3,753	529	1,358
5		12,749	2		48	3,539	435	1,637
6		6,460	2		134	3,466	817	1,735
7		6,441	2		1	2,746	230	1,754
8		6,441			15	3,175	213	4,723
9		3,568	2	41	732	2,267	211	1,721
10		873	51		65	5,295	411	1,625
11		201	51	4	64	5,026	363	1,482
12	796	201	51	2	56	3,937	382	801
13	1,884	201	51	2		2,011	301	265
14	24			2		1,678	125	173
15				2		440	238	140
Aggregate	6,451	47,368	243	525	7,147	43,546	27,601	25,079

At dam—	Lath and shingles.		Pit posts.		Mine braces.		Ties, railroad.	
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1			18,120		600		10,950	
2			25,500		560	80	1,600	
3			16,780	5		20	3,500	
4	6		11,515	75	160	60	200	
5		4	250	7,900				70
6		4		7,800			30	720
7		4		8,100			30	920
8		4		8,600			30	2,298
9				8,650			30	1,351
10				7,600			60	1,545
11				3,276			90	940
12				1,420				336
13				575				150
14			2	575				149
15								
Aggregate	6	16	72,167	54,576	1,320	160	16,520	8,479

Lockages made and traffic passed at Monongahela River locks, etc.—Continued.

At dam—	Wood.		General merchandise.		Farm, dairy, and orchard products.	
	Up.	Down.	Up.	Down.	Up.	Down.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1			7,339	15,012	1,070	119
2			9,161	5,462	1,082	98
3			7,647	1,992	961	64
4		33	4,842	1,707	829	79
5	2		4,865	1,652	836	158
6			4,477	1,275	666	117
7			3,064	1,225	272	27
8			2,485	948	155	41
9		1,500	2,092	921	73	20
10			725	176	13	4
11			711	182	15	1
12			710	176	11	
13			634	180		
14			653	187	13	
15	3		638	208	3	2
Aggregate	5	1,533	50,043	31,303	5,999	730

At dam—	Live stock, large.		Live stock, small.		Total tonnage.		Passengers.	
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Number.*	*Number.*
1	313	232		26	1,537,802	3,880,071	21,072	21,174
2	376	251	5	27	870,766	7,315,506	23,843	23,362
3	375	238	2	20	171,614	9,246,556	15,902	15,492
4	345	191	3	8	137,308	7,650,514	8,639	7,738
5	160	108	1	35	23,624	743,004	10,920	8,800
6	141	99	2	23	14,917	246,708	4,955	4,621
7	82	48	3		11,693	40,888	4,018	3,880
8	81	43	3		11,275	46,008	5,508	5,441
9	88	43	1		8,143	44,446	6,503	6,867
10	57	14	1		3,965	34,461	2,025	2,060
11	37	14	1		3,371	28,152	1,858	1,945
12	44	14	1		4,042	23,894	1,468	1,555
13	43	14	1		4,510	20,458	1,496	1,527
14	31	14	1		1,811	19,857	1,574	1,593
15	32	23	1		1,302	888	4,305	4,379
Aggregate	2,205	1,346	26	139	2,806,143	29,341,411	114,066	110,434

Total commerce of the river.

	Products.	Passengers.
Fiscal year:	*Tons.*[a]	*Number.*
1902	9,100,887	181,527
1903	11,369,814	101,457
1904	9,268,736	116,174
1905	9,211,752	78,458
1906	11,447,444	77,134
1907	11,817,128	47,216
Calendar year:		
1907	12,772,508	42,373
1908	9,667,229	28,164
1909	11,486,278	47,205

[a] 2,000 pounds.

The total commerce of the Monongahela River is estimated by taking all the downstream tonnage at Lock 3, except iron and steel products, the downstream tonnage of iron and steel products at Lock 1, and all upstream tonnage at Lock 1, plus the coal mined and shipped in pools 1 and 2, which amount is manifestly less than the real movement of commerce.

Monthly lockages of vessels at different dams for the calendar year 1909.

Lock No.—	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	1,596	1,446	1,650	1,632	2,016	1,812	1,321	1,183	1,088	1,141	1,152	1,070	17,107
2	802	885	944	958	1,082	950	903	883	834	859	855	774	10,729
3	859	879	994	1,010	1,064	959	924	891	831	876	910	847	11,044
4	1,386	1,324	1,428	1,549	1,742	1,542	1,668	1,262	1,193	1,275	1,382	1,260	17,011
5	313	259	423	443	404	379	430	524	440	335	331	263	4,544
6	59	78	175	226	233	222	185	261	166	97	119	65	1,886
7	49	16	54	72	105	114	137	167	138	96	106	68	1,122
8	75	58	106	133	137	127	217	268	163	113	109	64	1,570
9	78	52	103	129	147	113	205	217	146	100	122	78	1,490
10	43	15	40	24	68	83	156	130	103	70	92	70	889
11	47	15	45	30	50	65	147	142	91	56	89	51	828
12	35	16	36	35	42	49	82	107	78	63	73	34	650
13	30	7	27	26	22	35	57	75	57	32	66	59	493
14	27	12	31	28	34	47	72	94	54	43	38	23	503
15	1	9	22	35	83	88	137	127	101	68	34	10	715
Total.	5,400	5,071	6,078	6,330	7,224	6,585	6,641	6,331	5,483	5,224	5,478	4,736	70,581

The locks were temporarily closed to navigation during the calendar year 1909 for times and reasons as follows:

Locks.	Repairs.			Floods.			Ice.			Total time.			Number of times.
	d.	*h.*	*m.*	*d.*	*h.*	*m.*	*d.*	*h.*	*m.*	*d.*	*h.*	*m.*	
No. 1:													
Large	22	23	45	2	22	40				25	22	25	40
Small	171	5	30	2	22	40				174	4	10	8
No. 2:													
Inside	75	4	40	0	14	0				75	18	40	4
Outside	62	7	30	1	7	30				63	15	0	5
No. 3:													
Inside	1	9	5							1	9	5	2
Outside		2	35								2	35	1
No. 4:													
Large	24	8	0							24	8	0	1
Small	12	0	0	3	0	0				15	0	0	2
No. 5					18	20	9	0	0	9	18	20	2
No. 6							12	0	0	12	0	0	1
No. 7							12	0	0	12	0	0	1
No. 8							13	0	0	13	0	0	1
No. 9					12	0	12	0	0	12	12	0	2
No. 10							3	0	0	3	0	0	1
No. 11							4	0	0	4	0	0	1
No. 12							5	0	0	5	0	0	1
No. 13							11	13	30	11	13	30	1
No. 14							15	0	0	15	0	0	1
No. 15	8	2	30				8	0	0	26	2	30	2

CONTRACTS IN FORCE.

FOR BUILDING TWO LOCK HOUSES AT LOCK NO. 2, MONONGAHELA RIVER, BRADDOCK, PA.

Contractors: Johnson & Anderson, Braddock, Pa.
Rate: $4,468.50 each.
Date of approval: April 27, 1909.
Date of beginning work: May 13, 1909.
Date of expiration: September 20, 1909 (extended for a reasonable period).

FURNISHING AND DELIVERING LOCK-GATE OPERATING MACHINERY FOR LOCK 1, MONONGAHELA RIVER, PITTSBURG, PA.

Contractor: J. & J. B. Milholland Company, Pittsburg, Pa.
Rate: $4,379.35.
Date of approval: [a]
Date of beginning work: October 8, 1909.
Date of expiration: January 18, 1910 (extended for a reasonable period).

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[a] Emergency.

FURNISHING AND ERECTING LOCK GATES AT LOCK 1, MONONGAHELA RIVER, PITTSBURG, PA.

Contractor: W. N. Kratzer & Co., Pittsburg, Pa.
Rate: $10,000.
Date of approval:[a]
Date of beginning work: October 20, 1909.
Date of expiration: Delivery of gates, January 31, 1910, and erection within 60 working days thereafter (extended for a reasonable period).

FURNISHING AND INSTALLING AN AIR COMPRESSOR PLANT AT LOCK 1, MONONGAHELA RIVER, PITTSBURG, PA.

Contractor: American Compressor and Pump Company, Baltimore, Md.
Rate: $2,981.
Date of approval: November 3, 1909.
Date of beginning work: November 18, 1909.
Date of expiration: February 8, 1910.

E E 4.

IMPROVEMENT OF ALLEGHENY RIVER, PENNSYLVANIA, OPEN-CHANNEL WORK.

This work was in charge of Assistant Engineer J. W. Arras throughout the year.

A very small amount of work was necessary during the year to maintain a reasonably good open-river channel over the entire length of the Allegheny River. This was largely due to the absence of destructive freshets and ice gorges during the previous winter season. However, where attention was called to the necessity for channel cleaning or the repair of construction works such attention as was necessary has been given.

A small amount of paving was replaced in the dike at Nicholsons Island, 37 miles above the mouth of the river, and a similar service performed at Red Bank dike, involving altogether about 10 cubic yards of stone; also two small parties, properly equipped with tools and explosives, were set to work removing bowlders and snags from the channel of the river. One of these parties operated between Tionesta and Kennerdell, removing 34 cubic yards of bowlders, 35 cubic yards of gravel, and 10 snags. The other devoted itself to the removal of 215 cubic yards of bowlders deposited during a cloudburst in the channel opposite the mouth of the Kiskiminetas River, about 29 miles above the mouth of the Allegheny.

During the winter of 1909 and 1910 the snowfall in the Allegheny Valley was exceedingly heavy and the ice unusually thick. At the end of February the winter's accumulation of snow had reached a depth of 5 feet in some localities, having a measured water equivalent of 7½ inches. Notwithstanding this condition, however, no serious flood occurred, and, so far as is known, none of the works of improvement suffered serious injury therefrom.

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[a] Emergency.

APPROPRIATIONS.

March 3, 1879	$10,000.00	June 13, 1902	$10,000.00
June 14, 1880	20,000.00	June 13, 1902 (allotment, June 24, 1904)	[a]5,000.00
March 3, 1881	25,000.00	March 3, 1909 (allotment, Mar. 17, 1909)	1,000.00
August 2, 1882	15,000.00	June 25, 1910	5,000.00
July 5, 1884	35,000.00		271,000.00
August 5, 1886	30,000.00	Amount carried to surplus fund	1,375.48
August 11, 1888	25,000.00	Total	269,624.52
September 19, 1890	20,000.00		
July 13, 1892	25,000.00		
August 18, 1894	12,500.00		
June 3, 1896	12,500.00		
March 3, 1899	15,000.00		
June 6, 1900 (allotment, Aug. 17, 1900)	5,000.00		

COMMERCIAL STATISTICS, CALENDAR YEAR 1909.

Again the usual custom of gathering commercial statistics of the Allegheny River by communication with the individual shippers and receivers of freight by water has been followed, that being the only means available for securing even an approximate estimate of the water transportation of the valley. Generally reports of river trade are solicited only from those who conduct a regular navigation business, and little is known about the commerce of the much larger number of small, intermittent shippers. In view of these conditions it is probable that the commerce of the entire river as reported is less than the actual amount.

Commodity.	Short tons.	Commodity.	Short tons.
Barges (new)	8,922	Lumber	4,978
Billets	76,873	Manure	1,200
Boat bottoms (new)	14,612	Pit posts, ties, braces, etc	34,341
Brick	75	Queensware	6
Coal	486,150	Sand	491,709
Concrete	176	Stone	19,293
Engines	5	Tan bark	493
Farm products	4	Timber	14,329
General merchandise	5,542	Waste material, etc	127,000
Gravel	419,315	Wood	45
Iron and steel	529		
Kegs (empty)	9,900	Total	1,715,694
Lath	197		

E E 5.

IMPROVEMENT OF ALLEGHENY RIVER, PENNSYLVANIA—CONSTRUCTION OF LOCKS AND DAMS.

This work was in charge of Assistant Engineer J. W. Arras throughout the year.

The only work remaining to be done on the construction of Allegheny River locks and dams at the beginning of the year was the restoration of the Springdale bank at abutment of Dam 3, which scoured out in January, 1907. The embankment immediately behind the abutment had been made, the work remaining to be done being largely between the lower end of abutment and the Heidenkamp Mirror Company's works, a few hundred feet below.

As theretofore, the material for this fill, consisting of ashes, earth, furnace cinder and slag, construction refuse, etc., was furnished free on board cars by the Pennsylvania Railroad Company and unloaded by the United States hired-labor force. Before the end of August 1909, the funds for construction purposes had become practically exhausted, and the government labor force was transferred to Dam 2, Allegheny River, to unload material for bank protection there. In order, however, to further protect the bank above and outside of the works of the Heidenkamp Mirror Company, arrangements were made with Mr. Joseph Heidenkamp to deposit a limited amount of heavy furnace slag along the face of the bank. This work was continued until the end of the year. The total quantity of material deposited during the year was 25,000 cubic yards.

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[a] Of this allotment $1,375.48 was carried to surplus fund.

In addition to the heavy slag placed upon the bank for its protection against scour during freshets, 450 cubic yards of large rough stone, mostly from Lock 1, Monongahela River, were placed at the most exposed portion of the bank at the mirror works. Two severe freshets passed out of the Allegheny River during the winter and spring, but their effect on the protected bank was insignificant.

With the money appropriated for the purpose by the river and harbor act of June 25, 1910, it is intended to complete the restoration of the bank at the abutment of Dam 3, covering its river face with heavy furnace slag in order to prevent its removal by erosion.

Harbor lines, Allegheny River, from Aspinwall to Natrona.—After considering the objections made to the proposed lines at the public hearing of April 26, 1909, some slight modifications were made where changes appeared to be reasonable. In other instances the changes requested were considered unadvisable and were not made. The coordinates of the lines were computed and the maps showing the harbor lines recommended for establishment forwarded to the department on April 7, 1910.

APPROPRIATIONS.

August 5, 1886	$37,500.00
August 11, 1888	35,000.00
September 19, 1890	35,000.00
July 13, 1892	40,000.00
August 18, 1894	40,000.00
June 3, 1896	50,000.00
June 4, 1897	350,000.00
July 1, 1898	300,000.00
March 3, 1901	126,000.00
June 28, 1902	118,500.00
March 3, 1905 (allotment of July 12, 1905)	10,000.00
June 30, 1906	$281,226.63
March 2, 1907	235,000.00
August 31, 1908, amount transferred from operating and care of Ohio River	5,000.00
June 25, 1910	48,233.00
Received from other sources	1,137.14
Total	1,712,596.77

E E 6.

OPERATING AND CARE OF LOCKS AND DAMS, ALLEGHENY RIVER, PENNSYLVANIA.

This work was in charge of Assistant Engineer J. W. Arras throughout the year.

The slack-water structures on the Allegheny River, comprising two fixed dams and one movable dam, performed their functions satisfactorily during the year, passing through several freshets and ice gorges without suffering serious damage.

Lock and Dam No. 1.—As usual this structure required almost no repairs, the replacing of one Chanoine wicket in the dam, placing of a new valve sector in bear-trap pier, and closing of the space between leaves of smaller bear-trap gate with thin boards being the aggregate of attention given to the dam during the year. At the lock some scour had occurred at head of river wall, into which were placed 525 cubic yards of heavy stone and rough concrete blocks received free of cost. By way of modifications and improvements made, concrete steps were constructed between river lock wall and lower guard crib and some cement walk on lock grounds. A new concrete foundation was built for air compressor used in operating bear-trap gates. For several years gravel and waste deposits have been forming at both upper and lower approaches to lock. These had finally risen to such elevation as to interfere with the proper operations of the lock gates. During the month of April 7,023 cubic yards were removed by one of the government dredges, effectively clearing the lock entrances.

When Lock No. 1 was constructed a slip 55 feet in width and of a good navigable depth was left between the lock and bank of the river. In front of the lock grounds and extending down to the lower edge of Twenty-second street the United States erected a substantial retaining wall riverward and close to the Pittsburg Junction Railroad, which skirts the edge of the bank. Below Twenty-second street the railroad tracks were supported by a pile structure filled in with ashes and furnace slag. During the past year a portion of this slag-filled pile structure slid into the river, interfering with the proper use of the slip in connection with operation of the lock. Subsequently the railroad company reconstructed its pile support for tracks in a more substantial manner than originally and at the close of the year was engaged in dredging out and removing the slag deposits from behind the lock.

In addition to its usual duties the regular operating force at Lock 1 assisted in placing heavy riprap for the protection of Dams 2 and 3, Allegheny River, and of the bank at the Heidenkamp Mirror Company's works at Springdale.

In the spring of 1910 the movable dam was raised first on April 2. Only once since Davis Island dam, Ohio River, was placed in commission in 1885 has it become necessary to raise that dam in the month of April; namely, in 1887, when it was raised on the 12th and lowered on the 18th. The early maneuvering of the dam during the present season was due to the almost entire absence of precipitation during the month of March.

In December, 1909, the dam was permitted to stand until the pool was entirely closed with ice to a thickness of from 4 to 6 inches. Navigation being practically suspended on account of the inclemency of the weather and heavy ice, the pool was slowly drained and wickets lowered in order to avoid a possibility of damage to the structure should a sudden rise occur. This lowering operation was performed on December 23.

The maneuvers of the dam during the year were as shown in the following table:

Raised.	Lowered.	Days up.
Up at beginning of year	December 23, 1909	176
April 2, 1910	April 25, 1910	23
May 11, 1910	June 19, 1910	39
June 21, 1910		9
Total		247

Lock and Dam No. 2.—This structure continued in service throughout the year except when interfered with by heavy ice or freshets, and no difficulty was experienced in its operation.

The regular operation force, in addition to its usual duties, graded the lock grounds in 1909, placing thereon about 2,600 cubic yards of filling material furnished by the Pennsylvania Railroad Company; laid 1,150 linear feet of 1½-inch galvanized iron water pipe between Pittsburg city water main and lock houses; dug a sewer well 16 feet in depth through slag foundation in the cellar of each lock house and made sewer connection between houses and large municipal sewer underneath, and constructed concrete floors in cellars of lock houses. To prevent scour along downstream edge of dam, 200 cubic yards of stone were deposited along lower side of protection crib and 2,080 cubic yards of gravel above dam as back filling.

On January 18 the ice in the pool above the dam had attained a thickness of about 15 inches. Under the influence of warm weather and rain this ice moved out with great force, wrecking about 30 linear feet of the head of upper guard wall and breaking one of the anchorage bars and the top of I beam of outer upper lock gate. The necessary repairs were promptly made without detriment to navigation. A second ice gorge moved out of the Allegheny in the latter part of February, no damage, however, resulting therefrom.

On April 5 and 6, 1910, the lock was put out of commission for a period of eighteen hours, owing to a serious rupture in one of the principal water mains of the city of Pittsburg, which flooded and severely scoured the lock grounds, depositing so much material in the lock chamber as to interfere with the movements of the lock gates. After removing 250 cubic yards of deposits from the lock chamber above the gates the operation of the structure was resumed. This accident imposed considerable labor on the Government in restoring the lock grounds, involving the return to the grounds of about 1,200 cubic yards of material which had washed away. After restoring the grounds to their former condition about 100 cubic yards of top soil were placed thereon.

At the beginning of the year the lock houses, under contract with Messrs. Johnston & Anderson, of Braddock, Pa., were practically ready for the exterior brick veneering. Their construction was finished in October, 1909. After their completion a hot-air furnace for heating purposes was erected at each house.

Some delay was experienced in making the necessary fill for restoration and protection of eroded bank on the property of Mrs.

Mary C. Darlington at abutment of dam, owing to failure of the Pennsylvania Railroad Company to promptly lay the necessary trackage. However, the work was commenced in August, 1909, and at the close of the year had been practically finished. In all, 54,300 cubic yards of material were placed. Of this the greater portion was composed of ashes and other light materials, the river face only being covered with heavy furnace slag. Such rises as occurred during the winter and spring had but little effect on the uncompleted protection to the bank.

Lock and Dam No. 3.—This structure remained in satisfactory condition during the entire year, only minor repairs being necessary. The anchorages of lower gates were lowered slightly in order to accommodate them to some gate settlement due to wear in pivots or otherwise. Slight repairs were also made to the lock walls. Two hundred cubic yards of heavy stone and concrete blocks were placed alongside of lock-protection crib below dam to prevent scour. Also 45 cubic yards of stone filling and 480 cubic yards of top soil, furnished by the Pennsylvania Railroad Company, were deposited on lock grounds. The ladders in lock chamber, under way at the beginning of the year, were completed.

During the winter season a formidable ice gorge, 10 miles in length and as much as 15 feet in thickness, formed at the head of pool 3. It moved out, however, without doing any damage to the lock or dam.

Recent soundings below the dam show little change in the situation during the past year.

Soundings were taken at intervals of 25 feet on lines 200 feet apart, in order to determine the location of the best channel from Metzgers Island, at Tarentum, to Creighton station, a distance of 1.6 miles. These soundings were platted on the harbor-line maps.

Eight permits for miscellaneous structures in advance of the established harbor lines were granted during the fiscal year.

ALLOTMENTS FROM ACTS OF JULY 5, 1884, AND MARCH 3, 1909.

Amounts expended under allotments fiscal year ending June 30—	
1903 (part)	$5,233.62
1904	16,204.93
1905	27,235.94
1906	26,462.52
1907	82,998.35
1908	61,574.93
1909	37,839.51
1910	46,639.83
Total	304,189.63

Statement of expenditures for operation and care of locks and dams, Allegheny River, Pennsylvania, during the fiscal year 1910.

Item.	Amount.
Salaries and wages of regular hired labor force	$21,048.21
Miscellaneous supplies and services	2,317.34
Miscellaneous repairs	23,274.28
Total	46,639.83

COMMERCIAL STATISTICS.

Lockages made and traffic passed at Allegheny River locks during the calendar year ending December 31, 1909.

Item.	Designation.	Lock 1.	Lock 2.	Lock 3.	Total.
Lockages	Number	3,205	2,696	1,262	7,163
Steamboats	do	4,824	1,318	221	6,363
Coal boats, barges, flats, and boat bottoms	do	4,494	6,331	592	11,417
Rafts	do	63	118	51	232
Other craft	do		1,794	1,879	3,673
Coal	Tons	231,232	9,939	628	241,799
Pit ties	do			1,362	1,362
Manure	do	1,000			1,000
Iron or steel products	do	428	531	173	1,132
Sand	do	132,894	265,291	13,090	411,275
Gravel	do	123,579	292,941	414	416,934
Stone	do	3,869	1,723	124	5,716
Brick	do	75		2	77
Timber	do	8,519	5,635	5,607	19,761
Lumber	do	3,519	4,113	2,610	10,242
Lath	do			112	112
Pit posts	do	13,950	9,947	10,942	34,839
Braces	do	600	348	364	1,312
Ties, railroad	do	6,650			6,650
Wood	do	45			45
General merchandise	do	3,119	5,547	29	8,695
Farm, dairy, and orchard products	do		3	4	7
Barges (new)	do	2,628	2,628	2,664	7,920
Boat bottoms (new)	do	3,940	3,912	3,900	11,752
Tan bark	do	455	447	431	1,333
Total tonnage	do	536,502	603,005	42,456	1,181,963
Passengers	Number	11,034	5,524	8,857	25,415

E E 7.

IMPROVEMENT OF OHIO RIVER, PENNSYLVANIA.

This work was in charge of Assistant Engineer J. W. Arras throughout the year.

On the construction of Locks and Dams Nos. 2 to 5, inclusive, there remained to be performed at the beginning of the year the completion of the lock grounds, involving their elevation to a proper level by means of filling, the paving of same with concrete behind lock walls and along the outer slopes of terraces, and the building of necessary walks, steps, etc. At that time only a small amount of funds remained available for this work, an estimate for $75,000 to complete it having been submitted.

Upon the resumption of industrial activities in the Pittsburg district the free delivery on board cars at the various locks of waste-filling materials, comprising furnace slag and ashes, earth, and construction refuge, again became available. Under these circumstances it was decided to utilize the small balance of funds in the unloading of materials delivered free of cost by the Pennsylvania Company at Locks Nos. 3, 4, and 5, and via boat by Craighill & Miller or Pfeil & Miller at Lock No. 2, thus advancing this work as much as possible. Pursuant to arrangements with the Pennsylvania Company, the arrival of waste material began in October and continued until about March 22, at which time construction fund became exhausted. During that time the embankment on the grounds at Lock No. 3 was about two-thirds completed and those at Locks Nos. 4 and 5 nearly finished. The material was unloaded by the operating forces at the various locks, assisted by some hired labor. At the three locks the total quantity of material delivered was 80,120 cubic yards, which was distributed as follows: At Lock No. 3, 38,480 cubic yards; at Lock No. 4, 15,400 cubic yards; and at Lock No. 5, 26,240 cubic yards. At Lock No. 2, 2,070 cubic yards of similar materials, delivered by barge by Craighill & Miller or Pfeil & Miller, Pittsburg, Pa., were unloaded and deposited on the lock grounds or behind the upper guide wall.

With the funds made available by the river and harbor act of June 25, 1910, for the completion of the grounds at these locks it is confidently expected that the work can be accomplished during the coming year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement (Dam No. 7)	[a]$350,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

For previous project (see H. Doc. 421, 57th Cong., 2d sess., total as shown on p. 352)			$930,000.00
December 9, 1885, amount transferred from Falls of the Ohio River			10,000.00
			940,000.00
Received from other sources:			
Sales of land	$3,350.00		
Sales of condemned property	230.86		
		$3,580.86	
August 31, 1888, amount transferred to Drift Gap at Davis Island dam, etc		2,775.18	
			805.68
			940,805.68
For present project:			
September 19, 1890, construction of Lock and Dam No. 6			250,000.00
July 18, 1892, construction of Lock and Dam No. 6 and purchase land for No. 2			100,000.00
August 18, 1894, construction of Lock and Dam No. 6			75,000.00
March 2, 1895, construction of Lock and Dam No. 6			150,000.00
June 3, 1896:			
Construction of Lock and Dam No. 6			25,000.00
Construction of Locks and Dams Nos. 2, 3, 4, and 5, and purchase of sites for Nos. 3, 4, and 5			30,000.00
June 4, 1897:			
Construction of Dams Nos. 2, 3, and 4			400,000.00
Construction of Dam No. 6			300,000.00
July 1, 1898, continuing construction of Dams Nos. 2, 3, 4, and 5			595,000.00
March 3, 1899, continuing construction of Dams Nos. 2, 3, 4, and 5			400,000.00
June 6, 1900, continuing construction of Dams Nos. 2, 3, 4, and 5			595,000.00
June 13, 1902:			
Continuing construction of Locks and Dams Nos. 2, 3, 4, and 5			100,000.00
Completing Lock and Dam No. 6			175,000.00
Construction of Lock and Dam No. 7			23,000.00
March 3, 1903, continuing construction of Dams Nos. 2, 3, 4, and 5			300,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

For present project—Continued.		
March 3, 1905, completion of Locks and Dams Nos. 2, 3, 4, and 5, and modification of said locks and dams and of Lock and Dam No. 6 so as to secure a stage of 9 feet in the pools belonging thereto		$500,000.00
June 30, 1906, for continuing improvement by the completion of Locks and Dams Nos. 2, 3, 4, and 5, and the modification of said locks and dams and of Lock and Dam No. 6 so as to secure a stage of 9 feet in the pools belonging thereto		1,281,376.00
March 2, 1907, lowering of sill of Lock No. 6		70,000.00
June 25, 1910 (allotment Locks and Dams Nos. 2–5)		75,000.00
June 25, 1910 (allotment Lock and Dam No. 7)		150,000.00
June 25, 1910 (allotment Lock and Dam No. 9)		150,000.00
June 25, 1910 (allotment Lock and Dam No. 10)		40,000.00
Received from other sources:		
Sale of land	$14,500.00	
Sales of condemned property	1,719.75	
Sales of transferred property	250.00	
Sale of blueprints	89.46	
		16.559.21
Total for both projects		6,741,740.89

E E 8.

DREDGING POOLS 3, 4, AND 6, OHIO RIVER.

This work was in charge of Assistant Engineer J. W. Arras throughout the year.

Dredging pools 3 and 4.—Low bars exist in pools 3 and 4 immediately above and below Dam 3. Although it is important that they should be dredged out, yet their removal, as affecting navigation, is not very urgent, and owing to the fact that both government dredges have been engaged on more important works on the Monongahela River no dredging was done in these Ohio River pools during the year.

Dredging pool 6.—In pool 6 the work originally contemplated has been practically completed, as stated in the Annual Report of the Chief of Engineers for 1907, page 1725.

ALLOTMENTS FROM ACT OF MARCH 3, 1905.

Dredging pool 6.

June 12, 1905	$20,800
August 30, 1905, withdrawn and allotted for dredging pools 3 and 4	10,350
	[a] 10,450

Dredging pools 3 and 4.

August 30, 1905, received from allotment for pool 6	[b] 10,350
	20,800

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[a] Of this amount $950 was withdrawn or deposited

[b] Of this amount $1,550 was withdrawn or deposited.

E E 9.

OPERATING SNAG BOATS ON OHIO RIVER IN PENNSYLVANIA.

This work was in charge of Assistant Engineer J. W. Arras, and was carried on under allotments from the appropriation for operating snag boats on Ohio River.

During the past year a large number of loaded barges and coal boats were stranded on bars, many of which required removal or were scoured out and lost during freshets.

In October, 1909, four barges loaded with coal were stranded on a bar immediately below Dam 4; these were subsequently recovered by the owner. In January, 1910, a flat was sunk in the channel above Dam 4, 3 barges at Montgomerys Island below Dam 6, 1 barge at Dam 4, 1 barge at Dam 3, 1 barge about 2 miles below Dam 3, and 3 barges on Hays bar about one-half mile above Dam 3, all loaded with coal. Of these, five located in the channel were scoured out and lost during a rise, and the remainder recovered by the owners. Later in January the towboat *James Moren* drifted against the lower pierhead at Lock 5 and sank immediately below the lock. With the aid of the operating force at the lock the steamboat was raised within twenty-four hours.

In September two coal boats sank at Industry, below Dam 6. One of these was recovered and the other removed by the operating force at Dam 1. A large snag was also removed at Glasshouse ripple in the Pittsburg Harbor.

In May four barges were sunk at Wallerys bar, about a mile above Dam 5. These were recovered by the owner. On June 7 and 8 about 25 light coal boats, barges, and flats, loaded with coal, were stranded or sunk between Dams 2 and 3 and the towboat *Rover* overturned and wrecked. Many of the sunken craft, including the remains of the steamboat *Rover*, were located in the channel, where they seriously interfered with the movements of navigation. The steamboat was recovered by the owner. Of the coal-carrying craft, seven coal boats and one flat were removed by the operating force at Davis Island Dam on June 10, 11, and 13. Fifty-five hundred pounds of dynamite were used in their destruction. The remaining coal boats, barges, and flats were recovered by the owner or lost during the freshet which followed. The U. S. launch *Wenonah* was used for transporting the wrecking force, explosives, and equipment.

AMOUNTS EXPENDED UNDER ALLOTMENTS.

Fiscal year ending June 30—	
1906	$1,790.84
1907	1,324.39
1908	1,953.71
1909	2,300.97
1910	1,580.25
Total	8,950.16

***Statement** of expenditures for operating snagboats on the Ohio River, **Pennsylvania**, during the fiscal year 1910.*

Item.	Amount.
Services	$1,554.50
Fuel, explosives, and other supplies	25.75
Total	1,580.25

E E 10.

OPERATING AND CARE OF LOCKS AND DAMS, OHIO RIVER, PENNSYLVANIA.

This work was in charge of Assistant Engineer J. W. Arras throughout the year.

At the beginning of the year all of the movable dams were in raised position. Nothing occurred to interfere with their continuous service in the interests of navigation when the stage of water required or the condition of the weather permitted. The uppermost dams remained up for a greater number of days than ever before in their history, Dam 1 being up 234 days and Dam 2, 235 days during the year.

During the calendar year 1909 the lower pools were used but little for the storage of coal fleets destined to lower river points. However, in the spring of 1910 nearly 300 barges of coal were shipped into the fourth and fifth pools and subsequently went to the open river below on rises not requiring the lowering of the upper dams or sufficient to have safely shipped from Pittsburg Harbor had the dams been down. It is probable, therefore, that this method of transportation will be more extensively followed hereafter than in the past.

So satisfactory was the experiment with forged steel wheels and the new steel-faced water seal placed on the lower side of lower lock gate at Dam 2 in the spring of 1909 that 70 additional forged steel wheels were secured for replacing chilled cast-iron standard car wheels on the lower side of all gates from Lock 2 to Lock 5, inclusive. Although with difficulty, the cast-iron wheels were made to render service during the operating season of 1909. However, during the latter part of the winter and in the spring of 1910 the lower wheels of the lower gates at Locks 3, 4, and 5 were replaced with forged wheels, as was also the lower set of wheels on upper gate at Lock 5, and new water seals constructed. The lower wheels on upper gates at Locks 2, 3, and 4 will be replaced as soon as opportunity is afforded that will not interfere with navigation.

The gas-engine compressor plants in use on Locks 2 to 5, inclusive, have now been in operation for more than two years and are considered quite satisfactory for lock-operating purposes.

The winter of 1909 and 1910 being more severe than usual and the water remaining low until January, 1910, the pools became frozen to a thickness of from 4 to 6 inches in December. At the same time the Allegheny River over its full length, the Monongahela River above Lock 4, and the Ohio River from Dam 6 practically to Louisville Falls were closed with heavy ice. Under these conditions it was deemed advisable to lower all of the dams except No. 1, in the pool above which was stored a large cargo of coal and steel products. This operation was performed by first gradually lowering the pools, beginning with the lowermost dam, and following this with the dropping of the wickets in such manner as to prevent the ice from moving down upon the dams while in process of lowering. This was accomplished successfully except at Dam 4, where the ice moved when the dam was partly down and seriously injured the needle flat.

Gravel bars, principally due to the frequent maneuvering of bear-trap gates and the general operations of the movable dams, have formed below each of the structures during the past two years. These have increased to such proportions as to become generally detrimental to navigation and in some instances almost a menace. Their entire removal below the navigable passes of dams is considered necessary in the interests of navigation.

The derrick boat for general use in connection with clam-shell or orange-peel excavating, placing machinery, stone and other construction devices and materials, on which work had been commenced at the beginning of the year, was completed and put in service in the spring of 1910.

The following table shows the time at which dams were raised and lowered during the year:

Raised.	Lowered.	Days up.
DAM NO. 1.		
Up at beginning of year	Oct. 25, 1909	117
October 27, 1909	Jan. 3, 1910	68
April 9, 1910	Apr. 25, 1910	16
May 11, 1910	June 7, 1910	27
June 24, 1910		6
Total		234
DAM NO. 2.		
Up at beginning of year	Oct. 25, 1909	117
October 27, 1909	Dec. 22, 1909	56
December 28, 1909	Jan. 3, 1910	6
April 3, 1910	Apr. 25, 1910	22
May 10, 1910	June 7, 1910	28
June 24, 1910		6
Total		235
DAM NO. 3.		
Up at beginning of year	Oct. 25, 1909	117
October 27, 1909	Dec. 22, 1909	56
April 7, 1910	Apr. 25, 1910	18
May 10, 1910	June 7, 1910	28
June 24, 1910		6
Total		225
DAM NO. 4.		
Up at beginning of year	Oct. 25, 1909	117
October 29, 1909	Dec. 21, 1909	53
April 19, 1910	Apr. 25, 1910	6
May 9, 1910	June 7, 1910	29
June 29, 1910		1
Total		206
DAM NO. 5.		
Up at beginning of year	Oct. 25, 1909	117
October 27, 1909	Dec. 20, 1909	54
May 28, 1910	June 7, 1910	10
June 25, 1910		5
Total		186
DAM NO. 6.		
Up at beginning of year	Oct. 25, 1909	117
October 28, 1909	Nov. 6, 1909	9
November 30, 1909	Dec. 14, 1909	14
April 11, 1910	Apr. 19, 1910	8
Total		148

Lock and Dam 1.—The physical condition of this structure has been maintained with about the usual amount of labor and repairs. All of the masonry of the lock and bear-trap piers above the water line was repointed. A new foundation was constructed at upper lock-gate engine and gate-operating drum, involving about 55 cubic yards of concrete. A new gate-operating chain was placed on upper gate and the lower gate chain reannealed. Behind the lower guide wall 90 square yards of paving was placed on the fill made during the previous year. The stone with which this paving was done was received free of cost from Pfeil & Miller. Also a dry stone masonry wall, 121 feet in length by an average height of 8 feet, was constructed along the bank behind lower guide wall on which to store unused machinery, wickets, horses, props and other heavy extra parts for Ohio River movable dams. One thousand cubic yards of top soil were transported from Davis Island to the lock grounds, thereby completing same, and 1,384 linear feet of cement walk laid.

Very early in the year two axles on lower lock gate were broken, and later other wheel breakages on the same gate were discovered. It being impracticable to make the repairs when the dam was up without serious interference with navigation, new axles and wheels were secured and the season's operations conducted with the damaged gate. During the latter part of the winter the lower gate recess was unwatered and the gate repaired.

On the movable dam the following important repairs were made: One service bridge trestle in weir 3 removed, repaired, and replaced; two horses repaired and replaced in weirs 2 and 3 and one new horse and two new wickets placed; in the navigable pass three new horses and five new wickets were placed and three horses repaired and replaced; and in weir No. 1 two new horses and one new wicket placed. Also 950 tons of heavy rough stone and concrete blocks, delivered at the dam free of cost to the United States, were placed below the weirs to prevent scour. The back channel fixed dam with drum weir movable top, on which a temporary wooden fixed dam had been constructed in 1906, was thoroughly repaired, 3,720 feet b. m. of hemlock lumber being required. A new rake was constructed on one of the service flats and the flat overhauled and calked. General repairs were also made to the boilers, pipe lines, pumps, etc., comprising the power plant used for operating the lock.

During the year 14,450 cubic yards of waste material were delivered by Craighill & Miller or Pfeil & Miller and deposited on the head of Davis Island without cost to the United States.

Owing to the low stage of the water in the early part of the winter and the exceedingly large fleet of heavily laden coal and steel barges in the Pittsburg Harbor, it was deemed advisable to permit this dam to remain up, notwithstanding the frozen condition of the pool to the depth of 2 to 4 inches and of both the Allegheny and Monongahela rivers to a much greater thickness. On January 3 a rise occurred in the Monongahela River bringing all of the ice with it. The rise being largely from the headwaters of the stream, was slow in affecting the Ohio River below the dam. However, by permitting the freshet and ice to approach to within about 25 miles of Dam 1, an open-river stage equivalent to a normal No. 1 pool stage at Pittsburg was reached and the wickets of the dam were all successfully lowered before the ice reached the structure, in consequence of which no damage was done to navigation interests.

Lock and Dam 2.—As during the previous year, the number of breakages on this dam was very few, being limited to the replacing of 3 wicket props originally constructed for a 6-foot navigation, which broke or bent at the weld made for lengthening them for the higher dam. The forged steel gate wheels placed on lower gate in the spring of 1909 were entirely satisfactory, except that some of the bronze bushings, which had not been fastened, became loose. Accordingly, before raising the dam in the spring of 1910 another set of wheels with bushings well fastened was installed. These have been examined from time to time and were found to be in perfect condition at the end of the year. An 80-horsepower boiler was installed on a flat and a temporary pumping plant fitted up with which to unwater gate recesses at Ohio River locks.

Lock and Dam 3.—No repairs of any consequence were required at this structure. Five hundred and seventy-five tons of large, rough stone were placed along the lower edge of protection crib at bear-trap gates to prevent scour below them. Concrete steps and entrances to basements of power building and lock houses were constructed as the work of filling lock grounds progressed.

Lock and Dam 4.—At this structure the breakages were again excessive, as during the previous year. Twelve broken horse boxes and two horses were replaced with new ones. It is a noteworthy fact that practically all of the broken boxes have occurred in the navigable pass in the first 250 feet adjoining the lock. This section of dam was constructed under the first contract at No. 4, on which evidently an inferior class of horse boxes was installed. One hundred and twenty-five tons of large, rough stone and concrete blocks were placed below the bear-trap protection cribs and 100 tons at head of middle bear-trap pier. During the latter part of the season of 1909 the lower lock gate was operated with two of its wheel axles chained to upper gate posts. The injuries sustained by the maneuvering boat and needle flat upon the occasion of lowering the dam during the movement of the ice in the upper pool on December 21 were repaired.

The Enterprise Dredging Company deposited behind the upper guide wall 6,500 cubic yards of dredged material, secured from pier foundation for highway bridge under construction near the head of Pool 4.

Lock and Dam 5.—This structure again required almost no repairs, and its operation was exceptionally satisfactory. Two carloads of large, rough stone were added below the bear-trap gates to prevent scour and three carloads placed at lower end of abutment for same purpose. After completing the reconstruction of water seals and placing of forged steel gate wheels in May, the dam was permitted to remain down until the 28th to enable the Monongahela River Consolidated Coal and Coke Company to recover four stranded barges of coal on Wallerys bar, about a mile above the dam. During the year all materials used by the United States for the reconstruction of bear-trap gates at Dam 6 were transferred from cars to barges at Lock 5, no convenient railroad siding being available at the lower structure.

On October 27 the movable dam was raised satisfactorily, beginning with a stage of 9.6 feet on the navigable pass sill. The raising operation was completed within ten hours.

Lock and Dam 6.—Aside from the reconstruction of bear-trap gates this structure required little attention by way of repairs during the year. A new set of tubes was placed in water-tube boiler in power house, 300 tons of stone deposited on the outer side of river lock wall below dam where some scour had occurred, and a small crib structure rebuilt at head of upper guide wall.

Two bear-trap gates, each 120 feet long by 13 feet 2 inches vertical height above upper sill, were originally constructed in this dam. Their lower leaves were wood-filled structural-steel frames, the latter being almost identical with the steel framework in lower leaves of bear-trap gates of Dam 1, Allegheny River. The upper leaves are of practically the same design and construction as those in other steel bear-trap gates in this district. The gates were put in operation in 1903. When first raised they showed marked evidences of structural flexibility, which continued to increase until July, 1909, when both lower gates broke in two and were no longer considered serviceable for general operations.

In considering the reconstruction of these gates it was assumed that the upper leaves were in good condition, requiring only minor repairs; also that the steel framework of lower leaves was in such condition as to permit of their use for reconstruction. It was therefore decided to remove the wood filling from the lower leaves, rerivet steel framework where necessary, and cover same on top and over the upper portion underneath with ⅜-inch steel buckle plates, making them to conform, as nearly as possible, to the recently constructed bear-trap gates in Dams 3, 4, and 5. In order to facilitate the work it was further decided to erect the cofferdams, remove the wood filling and débris from the gates, keep the inclosures unwatered, and perform all other labor in connection therewith by hired labor save the structural-steel work, a contract for which was let to the Penn Bridge Company, Beaver Falls, Pa.

Materials were purchased and the erection of the cofferdam for the bear trap next adjoining the navigable pass commenced in September. In the latter part of October this cofferdam was completed and a pumping plant installed which was placed in operation October 29. During all this time the dam had remained up, but owing to difficulty with leakage it was lowered on November 6 to enable the pumping plant more readily to unwater the inclosure. This was accomplished on the 7th, and, after removing the timberwork from lower leaves and deposits from inclosure, the Penn Bridge Company commenced operations on the reconstruction of gate. Owing to the lateness of the season and the exceedingly inclement weather which followed in December, the progress made by the contractor on this work was not as rapid as had been anticipated, so that the reconstruction of the first gate had not progressed beyond the riveting of a few buckle plates when a suspension of operations for the winter became necessary. After resumption in the spring, several rises interfered with the work and caused considerable delay in its progress. However, at the end of the year the first gate was practically completed and the second, for which a cofferdam had been erected early in the spring of 1910 and the inclosure unwatered and wood filling of gate and deposits removed, was practically ready for placing of buckle plates. In order to facilitate the reconstruction operations, and because of the frequent rises in the spring of 1910, the dam has not been kept in raised position. It was raised, however, on April 11 in order to lower the second bear-trap gate, which had remained up during the winter, and flush out from 6 to 8 feet of sedimentary deposits both above and below it preparatory to the erection of a cofferdam. It was lowered on April 19, and has been permitted to remain down since that time.

As soon as the first bear-trap gate is completed, it is the intention to raise the movable dam and continue its operation during the completion of the second bear-trap gate.

On April 15 one of the government dredges arrived at this structure for the purpose of removing a portion of the steadily growing bar below the navigable pass. After taking out 1,540 cubic yards of material the dredge was returned to the Monongahela River to assist in the reconstruction of Lock 1.

Miscellaneous.—Five permits for miscellaneous structures in advance of the established harbor lines were granted during the fiscal year.

Along the right bank of the Ohio River in pool 5, between Baden, Pa., and Freedom, Pa., a distance of 2 miles, the harbor-line stations were replaced by concrete monuments.

Measurements of low-water discharge were taken at Lock 6.

ALLOTMENTS FROM ACTS OF JULY 5, 1884, AND MARCH 3, 1909.

Amounts expended under previous allotments (see p. 353, H. Doc. No. 421, 57th Cong., 2d sess.)	$298, 279. 64
Fiscal year ending June 30—	
1903	43, 267. 74
1904	19, 288. 83
1905	104, 138. 95
1906	66, 306. 37
1907	56, 027. 44
1908	78, 700. 21
1909	119, 954. 97
1910	134, 980. 89
Total	920, 945. 04

Statement of expenditures for operating and care of locks and dams, Ohio River, Pennsylvania, during the fiscal year 1910.

Item.	Amount.
Salaries and wages of regular hired labor force	$80, 243. 91
Miscellaneous supplies and services	12, 851. 05
Miscellaneous repairs	40, 385. 93
Contingencies	1, 500. 00
Total	134, 980. 89

COMMERCIAL STATISTICS.

Traffic through Locks and Dams 1–6, inclusive, Ohio River, during the calendar year 1909, as measured by the commerce through Lock and Dam 1.

Commodity.	Number.	Commodity.	Short tons.
Packets	562	Coal	2,466,710
Towboats	4,111	Iron and steel products	55,167
Model barges	126	Sand	613,965
Coal boats	1,932	Gravel	606,375
Coal barges	3,855	Lumber	22,486
Flats	18,183	Miscellaneous	56,944
Rafts	9		
Miscellaneous	1,946	Total	3,821,647
Total	30,674		
Passengers	69,961		

EMERGENCY CONTRACT IN FORCE.

FOR RECONSTRUCTING BEAR-TRAP GATES AT DAM 6, OHIO RIVER.

Contractor: Penn Bridge Company, Beaver Falls, Pa.

Rates: For cutting apart, straightening, providing 120 manholes and 448 limber holes, reaming and reriveting framework of two lower leaves, $11,290; for covering with buckle plate skin the steel framework of lower leaves of two bear-trap gates, 5.7 cents per pound for wrought steel; for painting two lower leaves of bear-trap gates, $1,400.

Date of contract: September 30, 1909.

Date of beginning work: On lower leaf of each bear-trap gate as soon as its cofferdam inclosure shall have been unwatered and timber filling of leaf and débris removed therefrom by the United States.

Date of expiration: Within ninety working days after date of commencement of work on each gate.

Supplemental contract dated December 30, 1909, approved January 11, 1910, provides for certain change in work and for retention from contract price of 15 cents for each rivet not removed from the work, as provided for in original contract.

E E 11.

IMPROVEMENT OF HARBOR AT PITTSBURG, PENNSYLVANIA.

This work was in charge of Assistant Engineer A. B. McGrew throughout the year.

Maintenance.—The channels were in good condition during the entire year. Under the terms of a permit for the construction of a retaining wall along the left bank of the Ohio River below the Point bridge, Pittsburg, the Pittsburg and Lake Erie Railroad Company removed about 10,000 cubic yards of material which had been placed along the bank before the harbor lines were established in 1895, and which was in advance of the harbor-line slope. This material was taken out of the river and placed behind the harbor line.

Inspection.—Patrol of the rivers and banks was maintained throughout the year, thereby preventing improper deposits. One hundred and eighty-three inspections and examinations of banks and bank fillings were made. Supervision of the work of commercial sand dredges was continued throughout the year. In December, 1909, when pool 2, Ohio River, was drained many waste piles which had been left by sand dredges were exposed, some of which were seriously obstructive to navigation, and it was necessary to have them removed for the safety of river traffic. The work was accomplished before the arrival of a boating stage in the open river. By direction of the War Department, the local officer is now vested with authority to suspend permits of dredging companies whenever, in his judgment, the interests of navigation require such action. This authority to suspend permits has had a beneficial effect on companies operating dredges in the rivers in this district.

Permits.—Eight applications for permits for miscellaneous structures were granted during the year. In some of these cases the proposed plans were modified to meet the requirements of navigation interests before they received favorable recommendation.

Local surveys and maintenance of harbor-line marks.—In a number of places where the old triangulation stations had been destroyed by private work new stations were marked by concrete monuments. In many instances also, at the request of private parties, the location of the harbor lines, where permanent structures were being built, was checked by this office.

Work on mapping the new system of triangulation from Rankin, Pa., to McKeesport, Pa., was continued at intervals. Along the Monongahela River at the plant of the Jones & Laughlin Steel Company, from Twenty-sixth street to the city limits near Thirty-fifth street, the triangulation stations were reestablished on masonry structures. Seven new stations connected with the original system of triangulation were established in this locality. Along the Allegheny River, between the Sixth and Forty-third street bridges, a number of observations were made of the velocity of the current.

Miscellaneous.—A public hearing before a Board of officers of the Corps of Engineers, constituted by S. O. 27, Office of the Chief of Engineers, dated June 15, 1909, in the matter of raising the Sixth, Seventh, Ninth, Eleventh, Sixteenth, Thirtieth, Thirty-third, and Forty-third street bridges over the Allegheny River, was held at Pittsburg, Pa., on March 8 to 11, inclusive, and on March 22 to 24, inclusive.

A public hearing was held in the local office on July 16, 1909, concerning plans submitted by the city of Pittsburg for a new bridge, known as the North Side Point bridge, over the Allegheny River near the site of the old Union bridge, which was removed under War Department order. The city proposed a three-span bridge practically in accordance with the foregoing order, but the river interests insisted that the bridge should either consist of one span or, in case this was impracticable, that it have only two spans with a center pier. Plans for the latter were then submitted by the city and approved by the department.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

For previous project (see H. Doc. 421, 57th Cong., 2d sess., p. 311)	$110,662.90
For present project for maintenance:	
June 13, 1902	10,000.00
June 13, 1902 (allotment June 14, 1904)	5,000.00
March 3, 1905	10,000.00
November 23, 1906, received by Treasury certificate of transfer settlement	4,000.00
March 2, 1907	10,000.00
March 3, 1909 (allotment March 17, 1909)	4,000.00
June 25, 1910	5,000.00
Received from sales of blueprints	52.69
Total for both projects	158,715.59

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Classified statement of river traffic in Pittsburg Harbor for calendar year 1909.

Commodity.	Tons.[a]
Acid	3,600
Barges (new)	2,628
Bottoms, coal boat (new)	3,912
Billets	86,098
Coal	9,804,008
Cement and concrete	312
Farm, dairy, and orchard products	2,267
General and miscellaneous	57,831
Gravel	1,064,761
Iron and steel products	99,096
Kegs (empty)	11,088
Live stock	1,353
Lumber and timber	45,336
Manure and fertilizer	1,340
Machinery	800
Oil	720
Pit posts, poles, braces, etc	10,320
Sand	1,107,521
Stone	3,167
Tan bark	447
Tar and roofing	7,549
Waste material	112,000
Total	12,426,154
Passengers ..... number	699,251

[a] 2,000 pounds.

NOTE.—The table gives only actual amounts of articles handled, care being taken not to duplicate any items. It should be stated that a very large part of this commerce is stored in the harbor from a week to several months and then rehandled and shipped out and the empties returned. Neither the rehandling nor the return of empties is considered in the table.

E E 12.

IMPROVEMENT OF YOUGHIOGHENY RIVER, PENNSYLVANIA.

The first appropriation for the improvement of this river was made in the river and harbor act of June 25, 1910, and no work was done prior to the close of the fiscal year.

APPROPRIATIONS.

June 25, 1910	$100,000

APPENDIX F F.

IMPROVEMENT OF RIVERS AND HARBORS IN THE WHEELING, WEST VIRGINIA, DISTRICT.

REPORT OF CAPT. F. W. ALTSTAETTER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Movable dams in Ohio River.
2. Operating and care of Lock and Dam No. 18, Ohio River.
3. Little Kanawha River, West Virginia.
4. Operating and care of locks and dams on Little Kanawha River, West Virginia.
5. Kanawha River, West Virginia.
6. Operating and care of locks and dams on Kanawha River, West Virginia.

United States Engineer Office,
Wheeling, W. Va., July 25, 1910.

Sir: I have the honor to transmit herewith the annual report of the works under my charge for the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

F. W. Altstaetter,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

F F 1.

MOVABLE DAMS IN OHIO RIVER BETWEEN THE PENNSYLVANIA STATE LINE AND CINCINNATI.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1910.

Dam No. 8 (about 46 miles below Pittsburg, Pa.).—The navigable pass for dam was completed August 24, 1909, the following work having been accomplished:

Excavation	cubic yards	394.8
Fill	do	470.4
Base for concrete	do	110.3
Riprap	do	873
Timber	feet b. m.	98,305
Concrete	cubic yards	628.2
Pipe	linear feet	1,414.5
Iron and steel	pounds	346,597

Under contract for building abutment, piers, and weirs, the abutment walls, foundations for Chanoine weir and pier No. 3, and crib below Chanoine weir were completed. Round and sheet piles were driven for piers Nos. 1 and 2 and bear-trap weirs. About one-half the concrete required was placed in foundations for bear-trap weirs. Timber and steel for bear-trap leaves were delivered. The following is a statement of the work accomplished:

Excavation	cubic yards	13,200
Rock excavation	do	517.1
Fill	do	2,000
Riprap	do	4,617
Round piles	linear feet	14,135.9
Sheet piles	feet b. m.	73,704
Timber	do	239,635
Concrete	cubic yards	4,901.4
Iron and steel	pounds	211,243
Pipe	linear feet	800

A contract was entered into February 17, 1910, for building two lock houses. These houses lack the interior woodwork, plumbing, and painting of being completed.

Under date of May 6, 1910, a contract was entered into for building a power house. The necessary excavation was made and about 80 per cent of the concrete footings for foundation placed.

Contracts were entered into for furnishing and erecting lock gates; for furnishing and installing gas engines, air compressors and receivers, pipe work, and lock-operating mechanism; for furnishing cover plates and Poirée-dam trestles; and for drilling a well and installing air lift. The well was drilled. Contracts were also entered into for building and equipping a maneuver boat and for building sewers. Work was in progress on the boat, and the sewers were completed.

Considerable plant was purchased for use in completing by hired labor such work as may be necessary. Action was taken to procure the railroad siding at the site.

Dam No. 11 (about 77 miles below Pittsburg, Pa.).—The work provided for in contract entered into June 30, 1904, for building lock and guide walls was completed April 9, 1910, the following being accomplished:

Grubbing and clearing	acres	0.5
Timber	feet b. m.	83
Common filling	cubic yards	2,795.4
Stone filling	do	2,590.2
Stone steps	linear feet	168
Concrete	cubic yards	280.2
Iron and steel	pounds	11,350.2
Pipe	linear feet	25.6

Four hundred and fifty-eight and three-tenths linear feet of supply pipes for the lock were placed under contract.

The 700 feet of navigable pass contracted for was completed July 8, 1909. Four hundred cubic yards of riprap protection was placed and the cofferdam removed.

Contract for abutment, piers, and weirs. The following permanent work was completed during the fiscal year: Three piers, foundations for bear-trap weirs, cribs below weirs, and 50 linear feet of Chanoine-weir foundation. Piling was driven for completing Chanoine weir and abutment and for the greater part of the walls below abutment. About two-thirds of the riprap protection was placed below the dam, and good progress made on the erection of the bear-trap leaves. The following is a statement of the work accomplished:

Excavation	cubic yards	24,096
Fill	do	1,099
Riprap	do	5,515.7
Round piles	linear feet	18,817
Sheet piles	feet b. m.	138,450
Timber	do	273,731
Concrete	cubic yards	7,424
Iron and steel	pounds	638,578
Bronze	do	597.75
Pipe	linear feet	1,390
Fittings	number	18
Drip pockets	do	3

A contract was entered into May 6, 1910, for building a power house. About 80 per cent of the excavation and 50 per cent of footing course were completed.

Contracts were entered into for furnishing and erecting lock gates; for furnishing and installing gas engines, air compressors and receivers, pipe work, and lock-operating mechanism; for furnishing cover plates; and for drilling a well and installing air lift. The well was drilled. A contract was also entered into for building and equipping a maneuver boat, work under which was in progress.

Considerable plant was purchased for use in completing by hired labor such work as is not contracted for. A small force was engaged in repairing the railroad siding which was purchased by the Government, and in building 726 linear feet of sewers and two manholes.

Dam No. 13 (about 96 miles below Pittsburg, Pa.).—Gas engines, air compressors and receivers, and pipe work were furnished and installed, and the approaches to lock and dam were dredged under contracts. Work at this site was completed, except building lock houses and Poirée dams. Contract for the Poirée-dam foundations was entered into and specifications prepared for building lock houses.

The lock has been successfully operated, and a number of lockages were made.

A small force was employed in grading government property, painting lock gates, equipping maneuver boat, and making minor alterations where necessary. A small flatboat was built.

Dam No. 18 (about 179 miles below Pittsburg, Pa.).—The power house contracted for September 28, 1909, was completed and the gas engines, air compressors and receivers, and pipe work installed. A well was drilled for supplying water.

A contract was entered into March 3, 1910, for building two lock houses. The foundations for the houses were built and the brickwork for one house completed to the second story. Due to a slide at the site for one of the houses, a supplemental contract was entered into for change of location.

A small force was employed in the grading of and in building walks and roadway on the lock grounds and in equipping maneuver boat.

With the exception of the lock houses, Poirée-dam trestles, covers for engine pits, and completing walks and roadway, work at this site is completed. The lock and dam was placed under the indefinite appropriation May 1.

Dam No. 19 (about 191 miles below Pittsburg, Pa.).—The following work was accomplished under contract for building 500 linear feet of navigable pass, 234 linear feet of pass having been completed:

Excavation	cubic yards	11,352.8
Timber	feet b. m.	234
Concrete	cubic yards	4,581.49
Iron and steel	pounds	86,468.85
Pipe	linear feet	468

A contract was entered into September 20, 1909, for building the remaining 200 linear feet of navigable pass, and 50 linear feet of pass was built. The following is a statement of the work done:

Excavation	cubic yards	2,381.4
Timber	feet b. m.	145
Concrete	cubic yards	924.822
Iron and steel	pounds	55,255.12
Pipe	linear feet	300

Plans were prepared for completing the lock and dam, and specifications were prepared for building lock and dam, except movable parts.

Dam No. 26 (about 278 miles below Pittsburg, Pa.).—The construction of the lock and dam is being carried on by hired labor. The cofferdam for lock and 350 linear feet of pass was completed, plant erected, and actual construction work begun August 10, 1909. The river and land walls, except gate recesses, 352 linear feet of navigable-pass foundation, and 137 pass wickets were completed. The following is a statement of the work accomplished:

Concrete	cubic yards	14,828
Iron and steel	pounds	482,417
Timber	feet b. m.	4,108
Pipe	linear feet	704
Drain tile	do	560
Excavation	cubic yards	12,174
Rock excavation	do	3,247
Fill	do	1,500

Contracts were entered into for furnishing and delivering iron and steel, timber, cement, coal, etc., for use in construction work, and considerable of the material was delivered. Additional plant was purchased.

Under contract entered into March 3, 1910, the construction of two lock houses was begun. At the close of the year both houses were under roof.

Specifications were prepared for power plant, and plans were completed for lock and dam.

DAM NO. 12.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $300,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

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[a] Exclusive of the balance unexpended July 1, 1910.

DAM NO. 19.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $300,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

DAM NO 20.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $200,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

DAM NO. 26.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $155,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

March 3, 1899:	
Construction of Dam No. 13	$50,000
Construction of Dam No. 18	50,000
June 6, 1900, continuing construction of Dams Nos. 13 and 18	470,000
March 3, 1901, continuing construction of Dams Nos. 13 and 18	40,000
June 13, 1902:	
Construction of Lock and Dam No. 8	50,000
Construction of Lock and Dam No. 11	50,000
Construction of Lock and Dam No. 19	25,000
June 28, 1902, continuing construction of Dams Nos. 13 and 18	46,600
March 3, 1903:	
Continuing construction of lock at Dam No. 8	200,000
Continuing construction of lock at Dam No. 11	200,000
Continuing construction of Dams Nos. 13 and 18	450,000
April 28, 1904:	
Continuing construction of Dam No. 8	50,000
Continuing construction of Dam No. 11	50,000
March 3, 1905:	
Completion of locks at Dams Nos. 8 and 11	160,000
Continuing construction of Dams Nos. 13 and 18	100,000
Construction of Lock and Dam No. 19	100,000
Purchase of site for Lock and Dam No. 26	35,000
June 30, 1906:	
Construction of locks at Dams Nos. 8 and 11	160,000
Continuing construction of Dams Nos. 13 and 18	160,400
March 2, 1907:	
Construction of Lock and Dam No. 8	251,845
Construction of Lock and Dam No. 11	198,343
Construction of Locks and Dams Nos. 13 and 18	174,778
Lock and Dam No. 19	200,000
Construction of Lock and Dam No. 26	100,000
March 4, 1907, construction of Dams Nos. 13 and 18	278,000
May 27, 1908:	
Construction of Lock and Dam No. 8	136,000
Construction of Lock and Dam No. 11	200,000
Construction of Dams Nos. 13 and 18	15,000
Construction of Locks and Dams Nos. 13 and 18	45,000
Construction of Lock and Dam No. 26	110,000

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[a] Exclusive of the balance unexpended July 1, 1910.

March 4, 1909:	
Construction of Lock and Dam No. 8	$364,000
Construction of Lock and Dam No. 11	300,000
Construction of Locks and Dams Nos. 13 and 18	220,000
Construction of Lock and Dam No. 26	300,000
June 25, 1910:	
Construction of Locks and Dams Nos. 8 and 11	50,000
Construction of Lock and Dam No. 12	150,000
Construction of Locks and Dams Nos. 13 and 18	50,000
Construction of Lock and Dam No. 19	220,000
Construction of Lock and Dam No. 20	40,000
Construction of Lock and Dam No. 26	400,000
	6,249,966

NOTE.—Received from sales, $1,724.25.

Act of March 2, 1907, repealed appropriation of $135,000 made by act of March 3, 1905, and reappropriated this sum for Lock and Dam No. 26.

CONTRACTS IN FORCE.

DAM NO. 8.

Contractor: The Hollerbach & May Contract Company.

Amount and character of work: $229,954.50, constructing abutment, piers, and weirs.

Rates: Common excavation, at 70 cents per cubic yard; rock excavation, $4 per cubic yard; fill, 75 cents per cubic yard; riprap, $3 per cubic yard; round piles, 50 cents per linear foot; sheet piles, $80 per thousand; sheeting, 4-inch, $60 per thousand; common timber, $67.50 per thousand; deck timber, $67.50 per thousand; oak timber, $90 per thousand; yellow-pine timber, $90 per thousand; concrete, $7 per cubic yard; structural steel, 5 cents per pound; reenforcing rods, 5 cents per pound; forgings, 5 cents per pound; bolts, etc., 5 cents per pound; iron castings, 5 cents per pound; steel castings, 5 cents per pound; bronze, 50 cents per pound; pipe, 3-inch, $1 per linear foot; pipe, 1½-inch, $1 per linear foot; flanged tees, 3-inch, $7.50 each; flanged long-radius elbows, 3-inch, $5 each; companion flanges, 3-inch, $2 each; companion flanges, 1½-inch, $1 each; globe valves, 3-inch, $15 each; cocks, 2-inch, $5 each; expansion joints, 3-inch, $10 each; drip pockets, $30 each.

Date of approval: August 6, 1909.

Date of beginning: September 8, 1909.

Date of expiration: 200 fair working days.

Contractor: The Guy Johnston Contracting Company.

Amount and character of work: $10,429.88, constructing two lockkeepers' houses.

Rates: Grading, at $51.65; concrete foundations, $716; concrete floors and steps, $120.90; brickwork, $607; cut stone, $155; window and door frames, $248.50; framing, $622.57; sheet-metal work, $105; tile roofs, $407; sewers, $197; plumbing, $427; heating, $235; plastering, $274.17; stucco, $79.20; floors, $154.71; porches and outside steps, $105; interior woodwork, $382.24; hardware, $107; glazing, $53; painting, $167.

Date of approval: March 2, 1910.

Date of beginning: March 18, 1910.

Date of expiration: 100 fair working days.

DAMS NOS. 8 AND 11.

Contractor: American Bridge Company, of New York.

Amount and character of work: Dam No. 8, $6,756.84, furnishing structural steel, etc.; Dam No. 11, $3,452.40, furnishing structural steel, etc.

Rate: Structural steel, forgings, bolts, etc., at 2.74 cents per pound.

Date of approval: March 19, 1910.

Date of beginning: April 3, 1910.

Date of expiration: August 21, 1910.

Contractor: Independent Bridge Company.

Amount and character of work: Dam No. 8, $34,093.36, furnishing and erecting lock gates. Dam No. 11, $34,093.36, furnishing and erecting lock gates.

Rates: Structural steel at 4.74 cents per pound; mechanical parts, 7.32 cents per pound; oak timber, $65 per thousand; hemlock or pine timber, $55 per thousand.

Date of approval: April 16, 1910.

Date of beginning: May 1, 1910.

Date of expiration: Forty fair working days from September 1, 1910.

Contractor: New Jersey Foundry and Machine Company.

Amount and character of work: Dam No. 8, $9,841.55, furnishing and installing lock-operating mechanism. Dam No. 11, $9,841.55, furnishing and installing lock-operating mechanism.

Rates: Gate jacks, sectors, etc., at $115 each; river-wall jacks, $130 each; gate winches, etc., $2,055 each; tanks, 100-gallon, $70 each; tanks, 150-gallon, $82 each; pipe, ¾-inch and smaller, 15 cents per foot; pipe, 1-inch, 24 cents per foot; pipe, 1½-inch, 27 cents per foot; pipe, 3-inch, 75 cents per foot; drip pockets, $5.50 each; screw fittings, 67 per cent of Crane's list price; unions, 69 per cent of Lunkenheimer's list price; flanged unions, 49 per cent of Crane's list price; cocks, 67 per cent of Lunkenheimer's list price; brass valves, 76 per cent of Lunkenheimer's list price; specialties, 107 per cent of net cost; hose and couplings, $9.50 per pair; oil, 33 cents per gallon.

Date of approval: April 21, 1910.

Date of beginning: May 7, 1910.

Date of expiration: Thirty fair working days from October 7, 1910.

Contractor: James Kinney, jr.

Amount and character of work: Dam No. 8, $1,065, drilling well and fitting it with air lift. Dam No. 11, $1,046, drilling well and fitting it with air lift.

Rates: Dam No. 8, well for $800; air lift, $265. Dam No. 11, well for $786; air lift, $260.

Date of approval: May 26, 1910.

Date of beginning: June 10, 1910.

Date of expiration: February 25, 1911.

Contractor: Hile & Higgs.

Amount and character of work: Dam No. 8, $27,524.50, building power house. Dam No. 11, $27,524.50, building power house.

Rates: Grading at $250; concrete, $2,000; concrete floors, $178; reenforced floors and steps, $2,196; reenforced floors for engine rooms, $728; brick floors, $268; brickwork, $6,632; cut stone, $1,922; window and door frames, $887; structural steel, 3½ cents per pound; structural steel for engine-room floors, 3½ cents per pound; architectural iron, $1,133; sheet-metal work, $605; tile roofs, $1,595; plastering, $755; plumbing, $1,600; plumbing fixtures, $300; hardware, $250; interior woodwork, $808; glazing, $192; painting, $495; extra grading, 50 cents per cubic yard; extra concrete, $5 per cubic yard.

Date of approval: May 13, 1910.

Date of beginning: As soon as conditions permit.

Date of expiration: January 13, 1911.

Contractor: James J. Walker Company.

Amount and character of work: Dam No. 8, $9,051.45, furnishing and installing air compressors and pipework. Dam No. 11, $9,051.45, furnishing and installing air compressors and pipework.

Rates: Air compressors, at $2,147 each; compressor accessories, $554 per lot for each dam; pipe, ¾-inch, 36 cents per linear foot; pipe, 2-inch, 66 cents per linear foot; pipe, 4-inch, $1.48 per linear foot; pipe, 6-inch, $2.80 per linear foot; drip pockets, $12 each; standard screw fittings, 64 per cent of Crane's list price; extra-heavy screw fittings, 68 per cent of Crane's list price; unions, 68 per cent of Lunkenheimer's list price; standard flanged fittings, 52 per cent of Crane's list price; extra-heavy flanged fittings, 60 per cent of Crane's list price; brass valves, 72 per cent of Lunkenheimer's list price; cocks, 60 per cent of Lunkenheimer's list price; pop safety valves, 46 per cent of Lunkenheimer's list price; pressure gauges, 55 per cent of Lunkenheimer's list price; standard iron-body valves, 62 per cent of Lunkenheimer's list price; heavy iron-body valves, 64 per cent of Lunkenheimer's list price; floor stands, 68 per cent of Crane's list price; specialties, 120 per cent of net cost.

Date of approval: May 19, 1910.

Date of beginning: As soon as conditions permit.

Date of expiration: February 19, 1911.

Contractor: Bury Compressor Company.

Amount and character of work: Dam No. 8, $760, furnishing and installing two air receivers; Dam No. 11, $760, furnishing and installing two air receivers.

Rate: $380 each.

Date of approval: June 25, 1910.

Date of beginning: As soon as conditions permit.

Date of expiration: Shop work, January 26, 1911; all work, March 27, 1911.

Contractor: Gee Electric Construction Company.

Amount and character of work: Dam No. 8, $8,052, furnishing and installing gas engines, etc.; Dam No. 11, $8,052, furnishing and installing gas engines, etc.

Rates: Gas engines, at $3,315 each; gas-engine accessories, $1,422 for each dam.

Date of approval: May 27, 1910.

Date of beginning: As soon as conditions permit.

Date of expiration: February 27, 1911.

DAMS NOS. 8, 11, AND 26.

Contractor: Thomas Carlin's Sons Company.

Amount and character of work: Dam No. 8, $5,200, building maneuver boat; Dam No. 11, $5,200, building maneuver boat; Dam No. 26, $5,200, building maneuver boat.

Rate: $5,200 each.

Date of approval: April 23, 1910.

Date of beginning: May 17, 1910.

Date of expiration: August 28, 1910.

DAM NO. 11.

Contractor: The T. A. Gillespie Company.

Amount and character of work: $249,537, constructing abutment, piers, and weirs.

Rate: Excavation at $1.50 per cubic yard; fill, $1.10 per cubic yard; riprap, $3 per cubic yard; round piles, 62 cents per linear foot; sheet piles, $85 per thousand; sheeting, 4-inch, $75 per thousand; common timber, $60 per thousand; deck timber, $60 per thousand; oak timber, $100 per thousand; yellow-pine timber, $100 per thousand; concrete, $5 per cubic yard; structural steel, 7 cents per pound; reenforcing rods, 4 cents per pound; forgings, 7 cents per pound; bolts, etc., 4 cents per pound; iron castings, 5 cents per pound; steel castings, 9 cents per pound; bronze, $1 per pound; pipe, 3-inch, $1 per linear foot; pipe, 1½-inch, 80 cents per linear foot; flanged tees, 3-inch, $5 each; flanged long-radius elbows, 3-inch, $6 each; companion flanges, 3-inch, $6 each: companion flanges, 1½-inch, $2 each; globe valves, 3-inch, $20 each; cocks, 2-inch, $6 each; expansion joints, $8 each; drip pockets, $25 each.

Date of approval: July 1, 1909.

Date of beginning: August 2, 1909.

Date of expiration: 200 fair working days.

DAM NO. 18.

Contractor: McClure Timber Company.

Amount and character of work: $682.50, furnishing yellow-pine timber.

Rate: $25 per thousand.

Date of contract: June 15, 1909.

Date of beginning: July 15, 1909.

Date of expiration: September 13, 1909.

Contractor: The Superior Portland Cement Company.

Amount and character of work: $434, furnishing Portland cement.

Rate: $1.24 per barrel (rebate, 7.5 cents for each sack returned).

Date of contract: April 14, 1910.

Date of beginning: April 24, 1910.

Date of expiration: December 31, 1910.

DAMS NOS. 18 AND 26.

Contractor: Stephen Davidson.

Amount and character of work: Dam No. 18, $12,100, building two lockkeepers' houses. Dam No. 26, $12,370, building two lockkeepers' houses.

Rates: Dam No. 18, $6,050 for each house. Dam No. 26, $6,185 for each house.

Date of approval: March 12, 1910.

Date of beginning: March 26, 1910.

Date of expiration: September 22, 1910.

DAM NO. 19.

Contractor: The Hollerbach & May Contract Company.

Amount and character of work: One hundred and eleven thousand three hundred and five dollars, constructing 500 feet of foundation for navigable pass.

Rates: Common excavation at $1.50 per cubic yard; rock excavation, $2 per cubic yard; oak timber, $5 per linear foot of sill; concrete, $5.25 per cubic yard; structural steel, 4 cents per pound; bolts, etc., 4 cents per pound; iron castings, 4 cents per pound; steel castings, 4 cents per pound; pipe, 4-inch, $1.50 per linear foot.

Date of approval: May 28, 1909.

Date of beginning: July 3, 1909.

Date of expiration: January 31, 1910. (Time limit waived.)

Contractor: The Hollerbach & May Contract Company.

Amount and character of work: Twenty-seven thousand one hundred and sixty-two dollars, constructing 200 feet of foundation for navigable pass.

Rates: Common excavation at $1 per cubic yard; rock excavation, $1 per cubic yard; oak timber, $5 per linear foot of sill; concrete, $9 per cubic yard; structural steel, 4 cents per pound; bolts, etc., 4 cents per pound; iron castings, 4 cents per pound; steel castings, 8 cents per pound; pipe, 4-inch, $1.50 per linear foot.

Date of contract: September 20, 1909.

Date of beginning: October 20, 1909.

Date of expiration: Sixty fair working days.

Contractor: The Atlas Portland Cement Company.

Amount and character of work: Five thousand nine hundred and eighty-five dollars, furnishing Portland cement.

Rate: One dollar and thirty-three cents per barrel.

Date of approval: May 27, 1910.

Date of beginning: June 19, 1910.

Date of expiration: December 31, 1910.

DAM NO. 26.

Contractor: Universal Portland Cement Company.

Amount and character of work: Twenty-six thousand eight hundred dollars, furnishing Portland cement.

Rate: One dollar and thirty-four cents per barrel (rebate, 10 cents for each sack returned).

Date of contract: October 4, 1909.

Date of beginning: October 19, 1909.

Date of expiration: November 30, 1910.

Contractor: The Campbell's Creek Coal Company.

Amount and character of work: $5,250, furnishing coal.

Rate: $1.75 per ton of 2,000 pounds.

Date of contract: February 5, 1910.

Date of beginning: February 10, 1910.

Date of expiration: When final delivery is made.

Contractor: Independent Bridge Company.
Amount and character of work: $594.75, furnishing bolts, etc.
Rate: 3.05 cents per pound.
Date of approval: March 15, 1910.
Date of beginning: March 29, 1910.
Date of expiration: August 1, 1910.

Contractor: James H. Beans.
Amount and character of work: $1,030.63, furnishing iron castings.
Rate: 2½ cents per pound.
Date of approval: March 9, 1910.
Date of beginning: March 24, 1910.
Date of expiration: July 27, 1910.

Contractor: American Bridge Company of New York.
Amount and character of work: $14,057.05, furnishing structural steel, etc.
Rates: Structural steel at 3.4 cents per pound; steel castings, 3.4 cents per pound; forgings, 4.75 cents per pound; steel castings, 6.25 cents per pound.
Date of approval: March 9, 1910.
Date of beginning: March 24, 1910.
Date of completion: July 27, 1910.

Contractor: The Hamilton Lumber Company.
Amount and character of work: $1,799.65, furnishing timber.
Rates: Oregon fir and yellow pine, 18 feet long and under, at $26 per thousand; Oregon fir and yellow pine, 20 feet long and over, $39 per thousand; white oak, 16 feet long and under, $32 per thousand; white oak, 20 feet long and over, $45 per thousand.
Date of contract: March 11, 1910.
Date of beginning: April 10, 1910.
Date of expiration: April 25, 1910.

Contractor: J. & J. B. Milholland Company.
Amount and character of work: $9,244.85, furnishing iron and steel.
Rates: Structural steel at 3.3 cents per pound; forgings, 4.5 cents per pound; steel castings, 5.2 cents per pound; iron castings, 4.65 cents per pound; bolts, rods, etc., 3.4 cents per pound; bronze, 25 cents per pound.
Date of approval: April 2, 1910.
Date of beginning: April 17, 1910.
Date of expiration: August 20, 1910.

Contractor: Pittsburgh Valve, Foundry, and Construction Company.
Amount and character of work: $1,839.37, furnishing pipe, fittings, etc.
Rates: Pipe, 4-inch, at 84 cents per linear foot; pipe, 3-inch, 59 cents per linear foot; pipe bends, 90°, 3-foot radius, 4-inch, $7.25 each; screw fittings—elbows, 90°, 3-inch, long-sweep, $2.70 each; elbows, 90°, 4-inch, $2.55 each; tees, 4-inch, $3.90 each; tees, 3-inch, $2.16 each; reducers, 3-inch to 2-inch, 50 cents each; plugs, 4-inch, 21 cents each; flanged fittings—elbows, 90°, 3-inch, long-radius, at $4.70 each; elbows, 90°, reducing, 4-inch to 3-inch, $6 each; elbows, 90°, 3-inch, $2.90 each; tees, 4-inch, $5.90 each; tees, 4 inches by 4 inches by 3 inches, at $6.30 each; flanged reducers, 4-inch to 3-inch, $6.25 each; companion flanges, shrink, 3-inch, $9 each; companion flanges, 3-inch, $2.70 each; companion flanges, 4-inch, $3.50 each; valves, etc.—globe valves, 3-inch, $13 each; cocks, 2-inch, $4.65 each; expansion joints, 3-inch, $8 each.
Date of contract: April 11, 1910.
Date of beginning: April 21, 1910.
Date of expiration: June 10, 1910.

Contractor: G. Elias & Bro.
Amount and character of work: $1,576.19, furnishing timber.
Rates: Yellow pine at $31.50 per thousand; white oak, $79 per thousand.
Date of contract: May 2, 1910.
Date of beginning: May 12, 1910.
Date of expiration: November 1, 1910.

COMMERCIAL STATISTICS.

Freight handled at the wharves of some of the principal cities between Dam No. 8, Ohio River, and Ripley, Ohio, during the calendar year 1909.

Name of city.	Freight.	Passengers.
	Tons.	*Number.*
Steubenville, Ohio	11,390	3,685
Wheeling, W. Va	131,000	63,500
Glendale, W. Va	8,335	....
Parkersburg, W. Va	7,220	7,685
Ironton, Ohio	21,900	18,000

The number of passengers includes excursionists.

The information contained in the foregoing table was obtained through the mayors of the several cities mentioned. It appears that no accurate record is kept of tonnage and passenger traffic at the towns on the Ohio River, and the quantities given in the above table are only approximately correct.

F F 2.

OPERATING AND CARE OF LOCK AND DAM NO. 18, OHIO RIVER.

Lock and Dam No. 18 is the first movable dam on the Ohio River in the Wheeling district to be placed under the indefinite appropriation. Construction work on this lock and dam was begun in December, 1902, and completed in April, 1910. The building of lock houses and other minor work remain to be done under the appropriation for improving.

A lock force was employed May 1, 1910, but continued high water made it unnecessary to raise the dam or operate the lock. The employees were engaged in making minor repairs, caring for government property, and assisting in building walks, roadway, etc.

The following is a statement of the commerce which passed the lock during June, 1910:

Bricks	number	12,000
Coal	bushels	9,060,500
Dry goods	tons	4
Farm products	do	411
Furniture	do	23
Groceries	do	15
Hardware	do	87
Live stock	number	915
Lumber	feet b. m	708,100
Oil-well supplies	tons	26
Paints	do	4
Railroad ties	number	33,420
Salt	barrels	75
Saw logs	number	905
Sundries	tons	3,351
Passengers	number	1,612

ALLOTMENT.

April 6, 1910	$2,900

Summary of expenditures for operating and care of Lock and Dam No. 18, Ohio River, for the fiscal year ending June 30, 1910.

Office expenses and superintendence	$157.00
Labor	644.00
Expenses	211.57
Repairs	20.20
Total	1,032.77

F F 3.

IMPROVEMENT OF LITTLE KANAWHA RIVER, WEST VIRGINIA.

With the completion of extensive repairs to Locks Nos. 1–4, daily packet service has been established between Parkersburg and up-river towns.

The following obstructions were removed during September from the river channel between Creston and Glenville: One hundred cubic yards of stone and 6 fallen trees; 39 overhanging trees were cut.

The maintaining of the channel above Burning Springs is of special benefit to the isolated communities of that part of the river, on which about 25 gasoline boats are now plying.

A number of wire and pipe-line crossings placed under War Department permits were inspected.

Five hundred dollars can be profitably expended each year on the stretch of river above Burning Springs (Lock No. 5) in clearing the channel. Congress provided in the river and harbor act of June 25, 1910, for the removal of the milldam at Stouts Mills. However, there are still many places in the channel where navigation is difficult and dangerous. It is estimated that it will require $5,000 to properly improve those places for open-river navigation.

The following is a statement of the work accomplished at Locks Nos. 1–4:

Plans and specifications for lock houses, storehouses, and out-buildings to be erected at Locks Nos. 1, 2, and 4 were approved.

Lock No. 1.—Rebuilt dam, using 242,500 feet of timber, 1,751 cubic yards of stone, 177 cubic yards of concrete, and 675 cubic yards of filling; repaired lock and lock gates, using 343 cubic yards of concrete and 18,963 feet of timber; and built upper guide crib, in which were placed 37,546 feet of timber, 727 cubic yards of stone, and 134 cubic yards of filling. One hundred and thirty-five feet of concrete walks were built.

Lock No. 2.—Steps were taken to procure by condemnation the additional land required at this site.

Lock No. 3.—Funds were provided in the river and harbor act of March 3, 1909, for completing repairs to lock and dam. The dam was rebuilt, 249,152 feet of timber, 1,873 cubic yards of stone, 132 cubic yards of concrete, and 1,345 cubic yards of filling being used; the abutment was rebuilt and the bank protected, using 38 cubic yards of concrete and 1,000 feet of sheeting. Flash boards were placed on the dam and minor repairs made to the lock gates. Steps were taken to procure by condemnation the additional land required at this site.

Lock No. 4.—The lock house purchased at this site was altered, the grounds graded, and 370 feet of concrete walks and 210 feet of roadway built.

A survey was made of the entire river with a view to modifying the existing system of locks and dams and to its further improvement. Two parties were placed in the field, one on the survey and another on soundings. The plotting of field notes and preparation of maps were completed in January. Additional information being required, a second survey was begun June 1. At the close of the year 22 miles of river were surveyed and 30 test holes drilled.

The information now being obtained by the resurvey of the river above Lock No. 5 will probably indicate whether the river is worthy of further improvement.

The commercial statistics for this river are contained in the report for operating and care of locks and dams on Little Kanawha River, West Virginia.

APPROPRIATIONS.

Total amount appropriated to December 31, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 327)	$214,418
March 3, 1905	1,000
March 3, 1905	163,000
March 2, 1907	81,000
March 3, 1909 (allotted Apr. 5, 1909)	30,000
June 25, 1910	5,000
Total	494,418

NOTE.—Received from sale, $186.10.

CONTRACT IN FORCE.

Contractor: The Superior Portland Cement Company.
Amount and character of work: $744, furnishing Portland cement.
Rate: $1.24 per barrel (rebate, 7.5 cents for each sack returned).
Date of contract: April 14, 1910.
Date of beginning: April 24, 1910.
Date of expiration: December 31, 1910.

F F 4.

OPERATING AND CARE OF LOCKS AND DAMS ON LITTLE KANAWHA RIVER, WEST VIRGINIA.

The slack-water improvement of this river consists of five locks and fixed dams which provide 4-foot navigation from the mouth at Parkersburg to Creston, a distance of 48 miles.

Navigation was suspended through the locks as follows:

On account of—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
	Days.	*Days.*	*Days.*	*Days.*	*Days.*
Repairs	53.0		108.0		
High water	.5	8	.5	4.5	0.5
Ice	17.5	18	23.0	21.0	24.5
Total	71.0	26	131.5	25.5	25.0

Due to the repairs being made at Locks Nos. 1 and 3 navigation was suspended through Locks Nos. 2 and 4 fifty days and sixty-one days, respectively.

Repairs to Locks and Dams Nos. 1–4 were completed. These structures are in much better condition than they have been for years, and pools are maintained without difficulty.

Lock No. 2.—Minor repairs were made to the lower step of dam, a small amount of timber and stone being used.

Lock No. 5.—The lock gates were repaired and painted, part of the dam resheeted, and the roofs of buildings repaired. The dam and guide walls are still in bad condition and may require rebuilding before the close of the fiscal year 1911.

ALLOTMENTS.

November 28, 1891	$1,500.00
July 15, 1892	4,426.65
July 21, 1893	3,837.97
July 16, 1894	3,491.03
July 20, 1895	3,378.17
July 24, 1896	830.72
July 23, 1897	1,684.03
August 3, 1898	3,038.53
July 21, 1899	2,331.58
July 14, 1900	2,271.61
June 25, 1901	3,470.84
July 12, 1902	2,705.25
July 20, 1903	$4,318.97
March 7, 1904	500.00
July 13, 1904	1,931.79
July 17, 1905	1,640.57
October 26, 1905	3,700.00
July 19, 1906	7,848.21
October 12, 1906	2,000.00
July 18, 1907	9,636.51
July 20, 1908	13,486.83
July 16, 1909	8,629.77
Total	86,659.03

Summary of expenditures for operating and care of locks and dams on Little Kanawha River, West Virginia, for the fiscal year ending June 30, 1910.

Office expenses and superintendence	$1,893.11
Labor	5,711.14
Fuel	15.75
Expenses	141.65
Repairs	278.38
Total	8,040.03

Statement of comparative passenger rates between Parkersburg, W. Va., and points on the Little Kanawha River.

	Steamboat.	Railroad.		Steamboat.	Railroad.
Leachtown	$0.25	$0.40	Dulin	$0.60	[a]$1.00
Newark	.35	.55	Burning Springs	.75	[a]1.00
Elizabeth	.40	.80	Sonoma	.90	[a]1.25
Palestine	.50	.95	Creston	.90	[a]1.25

[a] Includes boat fare from Palestine transfer.

Report of lockages at Locks Nos. 1–5, Little Kanawha River, West Virginia, for the calendar year ending December 31, 1909.

	Lock No. 1.	Lock No. 2.	Lock No. 3.	Lock No. 4.	Lock No. 5.
Steamboats	687	859	614	688	2,176
Barges and flats	517	519	465	440	873
Rafts	1,691	1,792	1,562	1,338	1,569
Miscellaneous	716	305	373	234	....
Total	3,611	3,475	3,014	2,700	4,618
Number of lockages	2,752	2,838	2,301	2,266	4,618

COMMERCIAL STATISTICS.

Season of Navigation.—Opened January 1, 1909; closed December 18, 1909.

Vessel classification.

Class.	American.	Foreign.	Total	Net registered tonnage.	Passengers.
Registered steamers	4	....	4	239	8,778

Freight traffic.

Article.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Bark and tanwood	25	$300	48	$0.04
Carbon black	1,908	381,600	48	.04
Coal	95	285	48	.04
Dry goods	534	534,000	48	.04
Farm products	564	67,680	48	.04
Furniture	60	12,000	48	.08
Groceries and paints	2,077	415,400	48	.04
Hardware	620	93,000	48	.04
Hoop poles	20	200	48	.005
Live stock	31	5,735	48	.09
Lumber	2,928	52,704	48	.0025
Oil-well supplies	1,528	305,600	48	.04
Salt	146	1,022	48	.04
Sawlogs	41,530	332,240	48	.002
Shooks	287	8,610	48	.01
Staves	2,038	101,900	48	.01
Sundries	2,214	221,400	48	.04
Railroad ties	27,870	222,960	48	.003
Total	84,475	2,756,636	....	....

Statement of comparative freight rates between Parkersburg, W. Va., and points on the Little Kanawha River.

Article.	Rate.					
	Elizabeth, W. Va.		Palestine, W. Va.		Creston, W. Va.	
	By boat.	By rail.	By boat.	By rail.	By boat.	By rail.
Bark and tanwood ......hundredweight..	[a] $2.50	$0.12	$0.08	$0.16	$0.10	$0.16
Bricks........................do....	[b] 2.50	.11	.08	....	....	....
Carbon black..................do....	.08	.12	.08	.12	.10	.16
Cattle......................head..	1.50	....	....	....	....	....
Coal......................bushel..	.025	.05	.05	....	.05	....
Coke..........................do....	.025	.05	....	....	....	....
Dry goods ....hundredweight..	.08	[c] .12	.08	.16	.10	.16
Farm products (not live stock).....do....	.08	.10	.08	.12	.10	.16
Furniture.....................do....	.16	.20	.16	.36	.20	.32
Groceries.....................do....	.08	.11	.08	.14	.10	.16
Hardware......................do....	.08	.11	.08	.16	.10	.16
Hogs........................head..	.35	....	.35	....	.35	....
Hoop poles.............hundredweight..	[b] 2.00	.05	....	....	....	....
Horses and mules..............do....	[d] 2.50	.09	....	....	....	....
Laths.........................do....	.08	.09	.08	.215	.10	.16
Lumber........................do....	[b] 2.50	.09	....	....	....	....
Oil-well supplies.............do....	.08	.11	.08	.18	.10	.16
Paints........................do....	.08	.12	.10	.12	.10	.16
Railroad ties.................do....	....	.08	....	....	....	....
Salt..........................do....	.05	.10	.10	....	....	....
Saw logs......................do....	....	.08	....	....	....	....
Sheep.........................do....	[d] .25	.05	.10	....	....	....
Shingles......................do....	.08	.11	.08	.16	.10	.18
Shooks........................do....	.08	.11	.08	.16	.10	.18
Staves........................do....	....	.11	....	....	....	....
Sundries......................do....	.08	....	.08	.14	.10	.16
Passengers........................	.40	.80	.50	.90	.90	1.25

[a] Cord. [b] Thousand. [c] Carload lots. [d] Head.

F F 5.

IMPROVEMENT OF KANAWHA RIVER, WEST VIRGINIA.

Under the authority contained in Public resolution No. 3, approved June 25, 1909, work was resumed on plans and specifications for constructing guide walls at Locks Nos. 4–11, and for constructing quarter boat and hull for snag boat. Both plans and specifications were approved by the department, and proposals received.

A contract was entered into with Clifton Brothers, of Zanesville, Ohio, for constructing the guide walls. Considerable material was delivered, but high water prevented the beginning of construction work.

Only one proposal was received for constructing the boats; as those prices were considered excessive, the work was advertised again under modified specifications. Better prices being received, the proposals were forwarded to the department for action.

Plans and specifications for rebuilding the ice piers near the mouth of the Kanawha were prepared, the work having been authorized in the river and harbor act of June 25, 1910. The piers are to be built of concrete.

Request has been received from those interested in the improvement of this river for the addition of guide walls to the locks for the lower entrances. Such walls would prove a benefit to the general navigation of the river.

The commercial statistics for this river are contained in the report for operating and care of locks and dams on Kanawha River.

APPROPRIATIONS.

Total amount appropriated to December 31, 1902 (H. Doc. No. 421, 47th Cong., 2d sess., p. 326)	$4, 272, 949. 45
June 25, 1910	24, 000. 00
Total	4, 296, 949. 45
Carried to surplus fund	1, 086. 31
Balance	4, 295, 863. 14
Received from sales, etc	3, 061. 66
	4, 298, 924. 80

CONTRACT IN FORCE.

Contractor: Clifton Brothers.

Amount and character of work: $25,921.79, building guide walls at Locks Nos. 4–11.

Rates: White-oak timber at $38 per thousand; riprap, $2 per cubic yard; iron and steel, 6 cents per pound; round piles, 39 cents per linear foot.

Date of approval: March 24, 1910.

Date of beginning: April 28, 1910.

Date of expiration: 330 fair working days.

F F 6.

OPERATING AND CARE OF LOCKS AND DAMS ON KANAWHA RIVER, WEST VIRGINIA.

The slack-water system of the Kanawha River consists of 10 locks and dams, of which 2 are fixed and 8 movable, and provides 6-foot navigation over a distance of 90 miles from its mouth at Point Pleasant. As mentioned in previous reports, the cost of maintaining this system is increasing, owing to its length of service. This is especially true at the movable dams, the first of which (Nos. 4 and 5) were completed in 1880, and the last (Nos. 9, 10, and 11) in 1898. At the close of the year the works were practically in good condition, although some extensive repairs will be necessary during the next fiscal year.

Except for about fifteen days, navigation was continuous during the year. Navigation was suspended as follows:

Lock No.—	Ice.	High water.	Repairs.	Total.	Lock No.—	Ice.	High water.	Repairs.	Total.
	Days.	*Days.*	*Days.*	*Days.*		*Days.*	*Days.*	*Days.*	*Days.*
2	16. 5	1. 9		18. 4	7	15. 6			15. 6
3	15. 8	2. 6		18. 5	8	15. 1			15. 1
4	15. 7		6. 1	21. 8	9	15. 2			15. 2
5	14. 9			14. 9	10	17. 0			17. 0
6	15. 6			15. 6	11	14. 8			14. 8

The movable dams were up from 249.96 days at Lock No. 4 to 214.07 days at Lock No. 10. At Lock No. 11 the dam was up 170.79 days. These dams were operated as follows:

Lock No.—	Times raised.	Times lowered.	Lock No.—	Times raised.	Times lowered.
4	9	9	8	7	8
5	9	9	9	6	7
6	7	8	10	5	6
7	6	7	11	3	4

Contracts were entered into for stone, timber for dredge, gate timber, and gate irons. The material was delivered except gate irons and gate timber. The greater part of the gate timber was delivered and good progress was made on the irons.

The following is a summary of the more important work accomplished during the year:

Lock No. 2.—A new gauge was made which was erected at Kanawha Falls, and three small chocks set on land wall of lock.

Lock No. 3.—Four check posts and three small chocks were set, two gate spars placed, tin work of lock houses painted, and fences whitewashed. The lock force also assisted in rebuilding dredge.

Lock No. 4.—Rebuilt coal house which had been destroyed by fire, finished and hung new lower gates, purchased new hurters for dam, built 50 feet of sewer and 64 feet of concrete walk, placed new roof on lock house and new derrick on service boat, and rebuilt incline track.

Lock No. 5.—Built 44 feet of sewer, rebuilt incline track, painted interior and exterior of lock houses and outbuildings, and set three chocks on land wall of lock.

Lock No. 6.—Finished painting exterior and interior of lock houses and outbuildings, placed one new wicket, and whitewashed 3,350 feet of fence.

Lock No. 7.—Built a small service boat, rebuilt incline track, painted tin work of lock houses and outbuildings, reset 7 cubic yards of riprap protection, and painted 600 feet and whitewashed 640 feet of fence.

Lock No. 8.—Placed new set of weir trestles, two sill boxes, and one hurter in dam; placed three new gate valves; completed two vaults for water-closets; built small service boat, 32 feet of concrete walk, and 96 feet of fence; rebuilt incline track; set three chocks on land wall; painted lock irons; and whitewashed 2,432 feet of fence.

Lock No. 9.—Placed 294 cubic yards of stone as bank protection; built 11 feet of concrete curbing, and 453 feet of concrete and 178 feet of brick walks; placed two iron check posts; set one chock; and painted tin roofs of five lock houses and irons of lock and dam.

Lock No. 10.—Built 28 feet of concrete walk, placed 150 cubic yards of riprap below lock, rebuilt incline track, set two chocks on land wall and two iron check posts, placed gate spars, and whitewashed 1,488 feet of fence.

Lock No. 11.—Completed repairs to lock gates, built 40 feet of concrete walk, concrete steps to office and shop, and concrete platform for cistern, and built small service boat and brick protection wall in front of office.

United States telephone line.—Four steel towers were erected for river crossings at Locks Nos. 5 and 8. A number of reinforced-concrete poles were made. The new wooden poles, cross-arms, and pins placed were given two coats of wood preservative.

U. S. dredge *Addison* removed 46,875 cubic yards of material, a wrecked barge and a fuel flat, and 104 snags. Some necessary repairs were made to the boat.

All timber, steel, and other material required in rebuilding the dredge were purchased. The hull is finished, except decking and calking.

U. S. towboat *James Rumsey* was employed as tender to the United States dredge, and in transporting materials, supplies, etc., for the locks. The boat was used in placing the new lower gates for Lock No. 4, and in removing 97 snags. The usual spring repairs were made.

U. S. launch *Mascot* was repaired and sent to Dam No. 26, Ohio River, for use in connection with work at that point.

ALLOTMENTS.

For fiscal year 1885		$7,075.00
For fiscal year 1886		8,710.00
July 8, 1886		11,170.00
June 17, 1887		13,289.00
February 4, 1888		3,549.70
August 16, 1888		19,990.02
July 11, 1889		19,261.61
July 16, 1890		25,702.27
October 9, 1890		3,400.00
July 14, 1891		19,453.00
July 6, 1892		21,891.64
July 12, 1893		24,549.41
July 10, 1894		30,600.00
July 2, 1895		30,200.00
July 25, 1896		37,082.59
August 2, 1897		22,700.77
July 26, 1898		36,331.90
September 29, 1898		2,650.00
June 2, 1899		14,000.00
August 2, 1899		36,416.13
April 10, 1900		1,400.00
July 13, 1900		$49,444.47
July 3, 1901		47,506.31
May 16, 1902		2,500.00
June 23, 1902		9,500.00
July 17, 1902		52,859.86
July 14, 1903		61,946.86
July 15, 1904		60,770.71
July 17, 1905		53,740.86
July 20, 1906		103,726.10
July 18, 1907		70,314.25
May 2, 1908		5,467.92
July 20, 1908		104,824.52
July 19, 1909		76,079.53
Total		1,088,104.43
Withdrawn, fiscal year—		
1888	$2,049.70	
1890	.01	
		2,049.71
Balance		1,086,054.72

NOTE.—Received from sales, etc., $50.10.

Summary of expenditures for operating and care of locks and dams on Kanawha River, West Virginia, for the fiscal year ending June 30, 1910.

Office expenses and superintendence	$9,355.89
Labor	58,468.78
Fuel	821.13
Expenses	576.10
Repairs	15,093.70
Total	84,315.60

CONTRACTS IN FORCE.

Contractor: W. M. Ritter Lumber Company.
Amount and character of work: $3,065, furnishing white-oak timber.
Rates: $39 per thousand and $55 per thousand.
Date of contract: January 12, 1910.
Date of beginning: February 11, 1910.
Date of expiration: May 12, 1910 (time limit waived).

Contractor: Charles Hegewald Company.
Amount and character of work: $1,275.11, furnishing ironwork for lock gates.
Rates: Steel, at 4.999 cents per pound; cast iron, 4.399 cents per pound; machinery and hard steel, 12.399 cents per pound; bronze, 23.99 cents per pound.
Date of contract: April 12, 1910.
Date of beginning: May 12, 1910.
Date of expiration: August 10, 1910.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened January 1, 1909; closed December 20, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered steamers	57	....	57	8,104	36,626
Unregistered rafts	58	....	58	....	....
Total	115	....	115	8,104	36,626

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Coal	26,642,000 bushels	1,065,680	$1,012,396	55	$0.00088
Timber [a]	10,799,000 feet	18,898	86,391	25	.0667
Staves, oak	5,000	30	125	30	.0667
Hoop poles	181,100	453	1,087	30	.02
Laths	228,600	69	686	30	.0277
Railroad ties, oak	104,580	11,156	47,061	40	([b])
Shingles	17,000	3	51	50	.0266
Bricks	79,000	198	634	50	.02
Salt	6,931 barrels	970	5,776	20	.035
Merchandise and produce	....	24,645	2,571,595	22	.1136
Total	....	1,122,102	3,725,802	....	....

[a] Timber includes floating logs and manufactured lumber, divided approximately as follows: Logs, rafted, etc., 9,363,000 feet; lumber, on packets, 1,436,000 feet. The freight rates are calculated on the latter alone, it not being practicable to determine a rate for floating logs.

[b] Ties were rafted; impracticable to determine rate.

Report of lockages at Locks Nos. 2 to 11, Kanawha River, West Virginia, for the calendar year ending December 31, 1909.

	Lock No. 2.	Lock No. 3.	Lock No. 4.	Lock No. 5.	Lock No. 6.	Lock No. 7.	Lock No. 8.	Lock No. 9.	Lock No. 10.	Lock No. 11.
Steamboats	790	933	1,263	1,353	1,840	1,580	1,942	1,800	1,825	1,972
Coal barges	210	477	1,320	1,823	3,107	3,177	4,411	5,150	5,100	5,025
Other craft	97	125	107	140	200	538	231	325	300	300
Total	1,097	1,535	2,690	3,316	5,147	5,295	6,584	7,275	7,225	7,297
Number of lockages	1,000	1,126	900	984	1,286	1,273	1,327	1,270	1,246	1,000

Statement of comparative freight rates between Charleston, W. Va., and points on the Kanawha River.

Article.	Rate.			
	Montgomery, W. Va.		Point Pleasant, W. Va.	
	By boat.	By rail.	By boat.	By rail.
Bark and tanwood		75 cents per ton, C.L.	$2 per cord	$1.80 per ton.
Bricks	$3 per 1,000	$1 per 1,000, C. L.	$2.50 per 1,000	18 cents per hundredweight.
Carbon black		5 cents per hundredweight, C. L.		Do.
Cattle	$1.25 per head	7½ cents per hundredweight, C. L.	$1.25 per head	21 cents per hundredweight.
Coal	4 cents per ton	50 cents per ton, C. L.	5 cents per ton	50 cents per ton, C. L.
Coke		80 cents per ton, C.L.[a]		90 cents per ton, C.L.[a]
Dry goods	20 cents per hundredweight.	22 cents per hundredweight.	15 cents per hundredweight.	21 cents per hundredweight.
Farm products (not live stock).	10 cents per hundredweight.	7 cents per hundredweight.	10 cents per hundredweight.	
Furniture	20 cents per hundredweight.	22 cents per hundredweight.	20 cents per hundredweight.	Do.
Groceries	10 cents per hundredweight.	do	10 cents per hundredweight.	Do.
Hardware	do	14 cents per hundredweight.	do	13 cents per hundredweight.
Hogs	25 cents per head	7½ cents per hundredweight, C. L.	25 cents per head	21 cents per hundredweight.
Hoop poles	$1 per 1,000	5 cents per hundredweight, C. L.	$1.50 per 1,000	9 cents per hundredweight.
Horses and mules	$1.50 per head	9½ cents per hundredweight, C. L.	$1.50 per head	21 cents per hundredweight.
Laths	50 cents per 1,000	5 cents per hundredweight, C L.	25 cents per 1,000	9 cents per hundredweight.
Lumber	$2 per 1,000 feet b. m	do	$2.50 per 1,000 feet b. m.	Do.
Oil-well supplies		14 cents per hundredweight.		13 cents per hundredweight.
Paints	10 cents per hundredweight.	do	10 cents per hundredweight.	21 cents per hundredweight.
Passengers	35 cents each	80 cents each	75 cents each	$1.15 each.
Railroad ties		5 cents per hundredweight, C. L.		9 cents per hundredweight.
Salt	10 cents per barrel	4½ cents per hundredweight, C. L.	10 cents per barrel	Do.
Saw logs		5 cents per hundredweight, C. L.		Do.
Sheep	25 cents per head	8½ cents per hundredweight, C. L.	25 cents per head	21 cents per hundredweight.
Shingles	20 cents per 1,000	5 cents per hundredweight.	20 cents per 1,000	9 cents per hundredweight.
Shooks		do		Do.
Staves		do	$5 per 1,000	Do.
Sundries	10 cents per hundredweight.	22 cents per hundredweight.	12½ cents per hundredweight.	

[a] From "district points."

In some instances the rail rates "from" or "to" are not the same as "between" points.

Coal rates by boat are based on a rate of $5 per barge of 500 tons, or more, per lock.

APPENDIX G G.

IMPROVEMENT OF RIVERS AND HARBORS IN THE SECOND CINCINNATI, OHIO, DISTRICT.

REPORT OF MAJ. JOHN C. OAKES, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Muskingum River, Ohio.
2. Operating and care of locks and dams on Muskingum River, Ohio.
3. Big Sandy River and Levisa and Tug forks, West Virginia and Kentucky.
4. Operating and care of locks and dams on Big Sandy River, West Virginia and Kentucky.
5. Kentucky River, Kentucky.
6. Operating and care of locks and dams on Kentucky River, Kentucky.
7. Guyandot River, West Virginia.

Engineer Office, United States Army,
Cincinnati, Ohio, July 20, 1910.

Sir: I have the honor to submit herewith the annual reports of the works under my charge for the year ending June 30, 1910.

Very respectfully, your obedient servant,

John C. Oakes,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

G G 1.

IMPROVEMENT OF MUSKINGUM RIVER, OHIO.

The natural condition of this work and projects for its improvement are described, and references for more extended information are given, in the current summary.

OPERATIONS DURING THE FISCAL YEAR.

Lock and Dam No. 11.—The work under contract with Mr. Edward J. Landor, of Canton, Ohio, dated April 4, 1907, for constructing this lock, dam, and its accessories was in progress from July 1, 1909, to December 31, 1909, and from March 25, 1910, to the close of the fiscal year. One hundred and eighty-one feet of the concrete dam, including its middle pier, was completed; the concrete abutment of dam was constructed, and 180 feet of the metal work for the movable crest of dam, comprising trestles, walk plates, and operating winches, was placed in position. The Boulé gates for the entire length of dam have been made and stored on the United States reservation. The embankment at lock was completed, except where temporary buildings and machinery have obstructed the work. The concrete pavement of terre-plein of lock, which extends 50 feet back from face of land wall, and from the upper wing wall to 50 feet below the lower end of lock, has been laid. The uncompleted upstream arm of a cofferdam for the section of dam, 148 feet long, yet to be built, was destroyed by ice and high water during the past winter; at the close of the year the construction of cribwork for this cofferdam was in progress.

The following is a statement of work done during the year:

Classification.	Unit.	Quantities.	Rate.	Amount.
Earth excavation	Cubic yards	296.10	$0.60	$177.66
Rock excavation	....do	48.00	2.00	96.00
Embankment	....do	4,644.00	.50	2,322.00
Concrete	....do	2,256.51	7.00	15,795.57
Iron and steel	Pounds	37,512.00	.075	2,813.39
Timber	Feet b. m	11,464.00	40.00	458.56
Piling, round	Linear feet	4,032.00	.35	1,411.20
Skilled labor	Hours	52.00	.30	15.60
Unskilled labor	....do	13.00	.20	2.60

Owing to the limited height of its sill the protection afforded the metal work of the movable dam when lowered is inadequate. During the past winter 12 of the trestles for Boulé dam were damaged, 6 having been rendered entirely unserviceable. Steps have been taken to raise the crest of the permanent dam 1 foot and to replace the lower trestle boxes of the movable dam with modified castings.

Commercial statistics are reported under the head of "Operating and care," etc.

APPROPRIATIONS.

Total amount of all appropriations for this work to June 30, 1902 (see H. Doc. No. 421, 57th Cong., 2d sess., p. 306)	$138,300.00
March 3, 1905	118,000.00
March 2, 1907	48,000.00
	304,300.00
Received from sales, etc	616.68
Total	304,916.68

CONTRACTS IN FORCE.

CONTRACT FOR BUILDING LOCK AND DAM NO. 11 AND ACCESSORIES, MUSKINGUM RIVER, OHIO.

Name of contractor: Edward J. Landor.
Date of approval: April 16, 1907.
Date of beginning: April 26, 1907.
Date of expiration: December 31, 1908.

Item.	Contract price (unit rate).
Earth excavation..........cubic yard..	$0.60
Rock excavation..........do....	2.00
Embankment..........do....	.50
Concrete..........do....	7.00
Iron and steel..........pound..	.075
Riprap, placed..........cubic yard..	1.00
Riprap, furnished and placed..........do....	1.50
Timber..........M feet b. m..	40.00
Piling..........linear foot..	.35
Dwellings..........each..	3,250.00
Outbuildings..........do....	250.00
Office building..........	400.00
Cisterns..........each..	130.00

G G 2.

OPERATING AND CARE OF LOCKS AND DAMS ON MUSKINGUM RIVER, OHIO.

Under an allotment from the indefinite appropriation for operating and care of canals and other works of navigation there has been expended during the year $50,130.25.

The system comprises 10 locks with fixed dams and 4 short lateral canals aggregating 2½ miles in length. The canal at Dam No. 9, 1 mile in length, although not now needed for navigation, is maintained to furnish water power and to supply water needed for docking purposes in the old lock at its lower end.

Navigation was suspended a total period of sixty-seven days—forty-six days on account of ice and twenty-one days on account of high water and interruptions to the operations of the locks due to silting of their chambers.

The following repair work, in addition to the ordinary work incident to the operation of the slack-water system, was done during the year:

Lock No. 1.—Under contract with Clifton Brothers, of Zanesville, Ohio, dated September 21, 1909, nine guide piles were placed below the lock, extending from its land wall to abutment of railroad bridge, a distance of 90 feet.

Cost of work, 285 linear feet piling, at 60 cents........................ $171

Minor work comprised refilling erosions in bank of mill race at lock master's dwelling, repapering rooms in second story and retinting rooms in first story of lockman's dwelling, reconstructing crib work in upper-gate recess of river wall of lock, replacing water-service fixtures in lock master's dwelling, and clearing deposits from turbines used for operating the lower gates of lock and from the lock chamber.

Lock No. 2.—Under contract with Clifton Brothers, of Zanesville, Ohio, dated September 21, 1909, the crib extension below the right abutment of dam was replaced by a reenforced concrete revetment, 60 feet long, and completed October 31, 1909. The following is a statement of work done under the contract:

Classification.	Unit.	Quantities.	Rate.	Amount.
Excavation	Cubic yards	33.00	$0.80	$26.40
Concrete	do	105.10	9.60	1,008.96
Total				1,035.36

Minor work comprised refilling a washout in lock yard, rebuilding steps from river wall of lock to guard crib above, and replacing pump at lock master's dwelling. Tile lock gauges were received.

Lock No. 3.—Under contract with Clifton Brothers, of Zanesville, Ohio, dated September 21, 1910, the reenforced concrete revetment of river bank near lock was extended 100 feet. The following is a statement of work done under this contract:

Classification.	Unit.	Quantities.	Rate.	Amount.
Excavation	Cubic yards	128	$0.50	$64.00
Filling	do	237	.70	165.00
Concrete	do	92	9.90	910.80
Total				1,140.70

Refastened loose shaft to balanced discharge valve in river wall of lock with two steel pins.

Cost of materials	$10.54
Cost of labor	53.16

Renewed top timbers and fender plank of the four lock gates.

Cost of materials	$41.95
Cost of labor	58.05

Refilled, with 410 cubic yards earth, a flood-damaged embankment at the left abutment of dam.

Cost of labor	$187.14

Minor work comprised replacement of wooden platform at lower end of river wall of lock, refilling erosions in the canal embankment, and keeping banks of a canal, three-fourths mile long, mowed and cleaned.

Lock No. 4.—Replaced the concrete floor in cellar of lock master's dwelling and built a rear porch to the building.

Cost of materials	$47.71
Cost of labor	98.82

Under contract with Alonzo Hanson, of Wheeling, W. Va., dated October 21, 1909, concrete pavements were laid in the lock grounds as follows:

Classification.	Unit.	Quantities.	Rate.	Amount.
Concrete pavement	Square feet	1,552	$0.12	$186.24

Minor work comprised relaying drain pipe from the lock master's residence to river, repairing apparatus for operating guard gates of canal and lower gates of lock, refilling washout in terreplein of lock with 50 yards earth, and replacing about 25 square feet of pavement. Received tile for replacing gauges of lock.

Lock No. 5.—Under contract with Clifton Brothers, of Zanesville, Ohio, dated September 21, 1909, reconstruction in concrete of the guard crib 25 feet long below the river wall of lock was completed November 24, 1909. The following is a statement of work done under the contract:

Classification.	Unit.	Quantities.	Rate.	Amount.
Excavation	Cubic yards	118	$0.60	$70.80
Filling	do	50	.70	35.00
Concrete	do	74	9.90	732.60
Total				838.40

Replaced decayed timbers in guide crib above lock.

Cost of materials	$70.33
Cost of labor	16.00

Renewed decayed and worthless top timbers of the two lower gates of lock.

Cost of materials	$15.40
Cost of labor	32.96

Minor work comprised replacing broken racks of valve stems on lower gates of lock, reconstructing steps to guard crib at head of lock, refilling washout in terreplein of lock with 135 cubic yards earth, repairing machinery for operating lower gates of lock, and the concrete lining of cistern at lock house. Received tile for replacing gauges of lock.

Lock No. 6.—Expended 60 cubic yards rubble stone in repair of embankment at head of lock.

Cost of labor	$24.48

Received tile for replacing metal gauges of lock.

Lock No. 7.—Under contract with Alonzo Hanson, of McConnelsville, Ohio, dated February 21, 1910, removal of part of an abandoned timber conduit for the water-power plant at head of canal, construction of a concrete core wall in the excavation and refilling with earth the overlying embankment was completed April 25, 1910. The following is a statement of work done:

Classification.	Unit.	Quantities.	Rate.	Amount.
Excavation	Cubic yards	448.00	$0.50	$224.00
Filling	do	560.00	.50	280.00
Concrete	do	39.20	6.50	254.80
Total				758.80

Under contract with Clifton Brothers, of Zanesville, Ohio, dated May 13, 1909, the work of repairing 726 feet of the left bank of the canal was completed July 23, 1909. Operations were for fastening 300 feet timber waling to heads of piling and refilling and regrading over 700 feet of canal bank. The following is a statement of work done:

Classification.	Unit.	Quantities.	Rate.	Amount.
Timber	Feet b. m	2,455	$60.00	$122.75
Iron and steel	Pounds	623	.06	37.38
Embankment	Cubic yards	594	.50	297.00
Total				457.13

Minor work comprised repainting roof of workshop and gutters of storehouses, repairing fence around storehouse lot, repairing cover plates for valve machinery of lock and erosions of the canal embankment, repairing tramway and derrick in yard and flood-damaged windows of the workshop. Received tile for replacing gauges of lock.

In the workshop and yard at this place the new hull for floating pile driver was completed, a new barge was built, and a work and store boat was built for the U. S. dredge *Malta*. Lumber and timber was dressed and prepared for use in repair of gates, etc.

Lock No. 8.—Under contract with Clifton Brothers, of Zanesville, Ohio, dated September 21, 1909, the crib extension below the right abutment of dam, 60 feet in length, was reconstructed with reenforced concrete; the work was completed November 30, 1909. The following is a statement of work done under the contract:

Classification.	Unit.	Quantities.	Rate.	Amount.
Excavation	Cubic yards	343.00	$0.50	$171.50
Filling	do	316.00	.70	221.20
Concrete	do	138.97	9.60	1,334.11
Piling	Linear feet	348.00	.60	208.80
Total				1,935.61

Angle irons shaped to fill out cushions of the lower miter sill were provided.

Cost of material	$93.39
Cost of labor	8.64

Renewed top timbers of the four lock gates.

Cost of material	$41.95
Cost of labor	58.05

Refastened the balanced discharge valve in river wall of lock, which had become detached from its shaft.

Cost of labor	$32.79

Under contract with Alonzo Hanson, of Wheeling, W. Va., dated October 21, 1909, concrete pavements were laid in the lock grounds, as follows:

Classification.	Unit.	Quantities.	Rate.	Amount.
Concrete pavement	Square feet	1,620	$0.13	$210.60

Minor work comprising renewing 12 pieces sheathing on lower apron of dam; repairing roof and repapering rooms and repainting the interior woodwork of the lock master's dwelling; renewing cover of cistern and well and refilling washout in terreplein of lock. Received tile for replacing gauges of lock.

Lock No. 9.—Placed the right guard gate at head of canal in good working order by renewing its wooden pintel step, resetting pintel, repairing damaged bonnet and anchorage of gate and resetting 18 square feet of the coping stone on its abutment. Renewed the wooden hollow quoin of the left gate.

Cost of material	$122.08
Cost of labor	127.92

The downstream parapet, 25 feet long, on conduit of water-power plant below the lock was reconstructed in concrete.

Cost of labor	$82.08

Minor work consisted of repairing the lower guard crib of drawbridge below lock; installing a cased well with pump in the lock grounds; repairing and repainting lock houses; replacing, with concrete pavement, about 200 square feet of walk in the lock grounds; refilling washouts in terreplein of lock and in embankment at old lock; removing an abandoned hull from the canal and placing the old lock at this place, used for docking boats, in working order by removing sedimentary deposits from its chamber. Received tile for replacing gauges of lock.

Lock No. 10.—Refilled, with 135 cubic yards earth, shaped up, and sowed in grass, erosions extending over 140 feet of the canal embankment.

Cost of labor	$124.38

Under contract with S. W. Hoffman, of Zanesville, Ohio, dated October 23, 1909, a roadway with concrete pavement, 3 feet wide, was built on top of the canal embankment from near the Sixth Street Bridge to the lock master's dwelling and lock, a distance of 950 feet. The following is a statement of work done:

Classification.	Unit.	Quantities.	Rate.	Amount.
Concrete pavement	Square feet	3,019.50	$0.14	$422.78
Ballast	Cubic yards	40.00	1.10	44.00
Total				466.78

Minor work comprised replacing pintel and repairing anchorage of the right guard gate for canal; repairing valves of middle gates of lock, hand rails and machinery for operating 6 gates; repairing drains of canal embankment; removing snags lodged on dam; repairing pipes of the water service; papering rooms and repainting woodwork of the lock master's dwelling. Received tile for replacing gauges of lock.

Lock No. 11.—Operations were limited to removing trestles of dam damaged during the past winter and to clearing sedimentary deposits from chamber of lock.

U. S. dredge Malta.—The dredge was in commission from July 1, 1909, to December 18, 1909, and from April 16, 1910, to the close of the fiscal year. Operations extended over a total distance of 21,000 feet, excavating a total of 112,650 cubic yards of material at an average cost of $0.0985 per cubic yard. In addition to the usual work of dredging out canals, approaches to locks and shoals in the pools between Locks Nos. 1 and 10, channels were dug through shoals in the head of pool formed by Dam No. 10, and the pool was cleared of obstructions up to new Lock No. 11. Many of the worn-out and unserviceable parts of the machinery of the dredge were replaced with new ones, and a work and store boat was added to the dredging fleet.

Cost of material for renewal of fixtures and machinery	$1,225.13
Cost of material for work and store boat	22.02
Cost of labor constructing work and store boat	498.06

U. S. S. Merrill.—The steamer was employed as dredge tender and assisted in the removal of snags from channels, clearing deposits from lock chambers and working over shoals, after the subsidence of floods, with the view to temporarily increasing their navigable depths. The boat was also used in making inspection trips.

Number of miles run	1,715
Cost of repair parts	$309.90

The U. S. S. *Vega* was employed in transporting and towing supplies and material for the various locks and fuel for the dredge; in assisting in the repair work at the locks, especially in the repair of valves at Locks Nos. 3 and 8, and in the removal of snags and other obstructions from channels. The machinery was overhauled, renewed, and the boat repainted.

Number of miles run	2,518
Cost of repair parts	$396.21

The worn-out and unserviceable hull of a floating pile driver was reconstructed.

Cost of labor	$679.61

The reconstruction of barge *No. 3* was completed. Two barges in use, *No. 4* and *No. 5*, were placed on the temporary ways in old Lock No. 9 and recalked after renewing unserviceable timbers and planking.

Cost of material received for barge *No. 3*	$359.48
Cost of labor for barge *No. 3*	480.45
Cost of material for repair of barges *No. 4* and *No. 5*	24.00
Cost of labor for repair of barges *No. 4* and *No. 5*	100.90

Establishment of harbor lines at Zanesville, Ohio.—The four lines, aggregating 6.42 miles in length, as shown on map approved by the Secretary of War, under date of June 25, 1909, have been laid out on the ground, and the principal stations of the lines have been marked with permanent concrete monuments.

Summary of expenditures for operating and care of locks and dams on Muskingum River, Ohio, for fiscal year ending June 30 1910.

Services (including superintendence and inspection)	$30,975.26
Materials (including contract work)	11,740.32
Fuel	1,869.65
Supplies	1,297.28
Subsistence supplies (crews for towboats)	1,804.22
Miscellaneous expenses	643.54
Administration	1,800.00
Total	50,130.27

ALLOTMENTS.

Total amount of all allotments for this work to June 30, 1902 (see H. Doc. 421, 57th Cong., 2d sess., p. 306)	$1,385,802.94
Allotted—	
July 25, 1902	47,576.72
July 10, 1903	50,358.37
July 11, 1904	54,000.75
July 21, 1905	47,914.68
September 28, 1905	4,200.00
May 28, 1906	24,000.00
July 28, 1906	60,365.91
July 19, 1907	59,116.02
February 13, 1908	7,000.00
July 15, 1908	47,655.09
July 17, 1909	43,080.34
	1,831,070.82
Received from sales, etc	356.43
Total	1,831,427.25

SPECIAL WORK AUTHORIZED BY CONGRESS.

Allotted—	
March 21, 1895, protection wall at Zanesville	$1,651.00
June 17, 1895, pier of railroad bridge at Marietta	10,449.60
June 17, 1895, pier of county bridge at Taylorsville	5,834.20
Total	17,934.80

CONTRACTS IN FORCE.

CONTRACT FOR REPAIRING ABOUT 700 FEET OF CANAL EMBANKMENT AT LOCK NO. 7, MUSKINGUM RIVER (M'CONNELLSVILLE, OHIO).

Name of contractor: Clifton Brothers.

Date of contract: May 13, 1909.

Date of approval: (Emergency contract).

Date of beginning and date of expiration: To begin within ten days after date of receipt by contractor of one number of contract; to be completed on or before June 30, 1909.

Items.		Contract price (unit rate).
Piling	linear foot	$0.34
Timber	M feet b. m.	50.00
Iron and steel	pound	.06
Embankment	cubic yard	.50

Completed.

CONTRACT WITH CLIFTON BROTHERS FOR REPAIRS AT LOCKS NOS. 1, 2, 3, 5, AND 8, MUSKINGUM RIVER.

Name of contractor: Clifton Brothers.
Date of contract: September 21, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: To begin within ten days after date of receipt of one number of contract; to terminate March 31, 1910.

Items.		Contract price (unit rate).
At Lock No. 1:		
Piling	linear foot	$0.60
At Lock No. 2:		
Excavation	cubic yard	.80
Concrete	do	9.60
At Lock No. 3:		
Excavation	do	.50
Filling	do	.70
Concrete	do	9.90
At Lock No. 5:		
Excavation	do	.60
Filling	do	.70
Concrete	do	9.90
At Lock No. 8:		
Excavation	do	.50
Filling	do	.70
Concrete	do	9.60
Piling	linear foot	.60

Completed.

CONTRACT WITH ALONZO HANSON FOR CONSTRUCTING CONCRETE PAVEMENT AT LOCKS NOS. 4 AND 8, MUSKINGUM RIVER.

Name of contractor: Alonzo Hanson.
Date of contract: October 21, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: To begin within ten days after receipt of one number of contract; to expire December 31, 1909.

Items.		Contract price (unit rate).
Pavement at Lock No. 4	square yard	$0.12
Pavement at Lock No. 8	do	.13

Completed.

CONTRACT WITH S. W. HOFFMAN FOR CONSTRUCTING ROADWAY AT LOCK NO. 10, MUSKINGUM RIVER.

Name of contractor: S. W. Hoffman.
Date of contract: October 23, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: To begin within ten days after date of receipt of one number of the contract; expires December 31, 1909.

Items.		Contract price (unit rate).
Paving	square foot	$0.14
Ballast	cubic yard	1.10

Completed.

CONTRACT FOR CONSTRUCTING, IN CONCRETE, CORE WALL, ETC., AT LOCK NO. 7, M'CONNELSVILLE, OHIO.

Name of contractor: Alonzo Hanson.
Date of contract: February 21, 1910.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: To begin within twenty days after date of receipt of one number of the contract; expires June 30, 1910.

Items.	Contract price (unit rate).
Excavation .... cubic yard..	$0.50
Concrete .... do....	6.50
Filling .... do....	.50

Completed.

COMMERCIAL STATISTICS, 1910.

Season of navigation.—Opened July 1, 1909; closed June 30, 1910.

Vessel classification.

Class.	Number.	Net registered tonnage.	Passengers.
Steamers:			
Packet	4	659	29,649
Tow	8	1,215	....
Gasoline:			
Packet	1	15	840
Tow	13	257	....
Launches	8	80	1,650
Launches	70	....	4,200
Barges	12	....	....
Rafts	2	....	....
Total	118	2,226	36,339

Freight traffic.

Articles.	Quantities.	Short tons.	Valuation.	Average haul, miles.	Rate per ton-mile.
Brick .... number..	548,000	1,664	$5,408	20	$0.03
Cement .... barrels..	4,167	834	5,834	24	.03
Coal .... tons..	....	2,548	4,076	24	.02
Eggs .... cases..	21,900	548	3,288	39	.10
Flour .... barrels..	18,391	1,839	91,900	24	.06
Grain .... bushels..	167,950	5,039	117,565	14	.07
Hay and straw .... bales..	71,415	3,571	53,565	21	.07
Iron, manufactured .... pounds..	2,308,000	1,154	69,240	45	.04
Lime .... barrels..	5,125	513	3,600	25	.08
Live stock .... head..	3,466	1,040	124,800	40	.04
Lumber .... feet b. m..	2,978,000	5,956	59,560	18	.06
Merchandise, miscellaneous .... tons..	....	22,268	2,125,000	27	.05
Oil .... barrels..	2,220	444	9,435	26	.05
Poultry .... dozen..	3,540	106	18,000	21	.09
Produce .... pounds..	167,500	84	16,750	18	.06
Salt .... barrels..	4,522	678	4,974	21	.05
Sand and gravel .... tons..	....	7,967	3,900	4	.02
Stoneware .... gallons..	58,300	204	4,080	45	.04
Timber and ties .... cubic feet..	96,940	2,423	23,265	14	.02
Other building materials	....	76	760	24	.06
Total	....	58,956	2,745,000	....	....

List of boats plying Muskingum River, Ohio.

Name of boat.	Character.	Length.	Beam.	Draft.	Tonnage.
		Feet.	*Feet.*	*Inches.*	
Merrill	U. S. towboat	115	22	28	125
Vega	do	104	17½	26	90
Lorena	Packet	141	32	28	287
Valley Gem	do	125	26½	24	156
Sonoma	do	125	20	23	116
Jewell	do	120	23	18	100
Express[a]	do	80	18	24	60
Excel	Towboat	110	18	24	100
Pioneer City	do	100	35	24	100
Robert Rhea	do	170	40	36	350
Ray	do	126	28	24	100
R. Smith	do	120	22	36	100
Royal	do	124	22	34	150
Mountain State	do	110	20	24	50
Gazelle	do	112	22	24	50
Kid[a]	do	76	16	20	15
Friend[a]	do	62	15	20	14
Stonewall[a]	do	60	14	24	15
Sid[a]	do	40	12	24	10
Mountain Belle[a]	do	90	18	34	35
Gypsy[a]	do	40	14	24	10
Hustler[a]	do	35	14	24	10
Wander[a]	do	50	12	24	20
Beaver No. 2[a]	do	60	14	24	33
W. J. Roberts	do	75	16	24	50
Ora V.[a]	do	40	14	24	10
Albatross[a]	do	45	10	24	10
Sampson	do	50	16	24	25
Marietta	Gasoline launch	40	12	36	....
Laken	do	18	4	24	....
Truscot	do	16	4	24	....
Earl	do	14	4	30	....
Ada	do	24	6	36	....
Nixon	do	35	8	36	....
Freda	do	18	6	80	....
Le Loup	do	21	3½	28	....
Atlas	do	18	6	26	....
Avalon	do	18	6	26	....
Idler	do	14	5	20	....
Ethel	do	40	8	24	....
Grace	do	18	4	24	....
Lucy	do	14	3½	24	....
Gadabout	do	21	5½	20	....
Outing	do	35	7	30	....
Malew	do	46	10	36	....
Uarda	do	49	16	18	....
Ruth	do	18	4½	18	....
Alice	do	18	5	20	....
Beatty	do	20	5½	20	....
White Cloud	do	18	6	36	....
Askoskar	do	40	12	36	....
Lilian	do	20	5	30	....
Jeanette	do	16	4	12	....
Lucas	do	18	4½	12	....
Skidoo	do	17	5	12	....
Ethel	do	20	4½	20	....
Feeja	do	18	4½	24	....
Kodak	do	18	4½	16	....
Verna Mae	do	20	5	20	....
Edna	do	26	5	18	....
Hornet	do	26	5	18	....
Sylph	do	18	5	20	....
Lucy B	do	16	4	14	....
Grace	do	22	4½	14	....
Anna Louise	do	21½	5	18	....
Flirt	do	18	4	12	....
Marguerite	do	21½	4½	14	....
Dick	do	20	4¼	12	....
Louise	do	16	4	12	....
Pioneer	do	19	3½	12	....
Albert A	do	19	3½	12	....
Isaac Sheppard	do	20	4¼	18	....
Moose Eye	do	25	4	16	....
Bain	do	16	4	16	....
Hyacinth	do	18	4	16	....
Damfino	do	22	5½	20	....
Water Wagon	do	35	8	20	....
Kathryn	do	20	4½	18	....
Tannehill	do	16	4	12	....

[a] Gasoline boats.

List of boats plying Muskingum River, Ohio—Continued.

Name of boat.	Character.	Length.	Beam.	Draft.	Tonnage.
		Feet.	*Feet.*	*Inches.*	
Sea Gull	Gasoline launch	36	6½	30	
Rambler	do	20	4½	18	
Beck	do	16	4	24	
Mildred	do	50	12	24	
Helen B	do	45	12	24	
Nancy Lee	do	22	5	21	
Alice K	do	35	9	26	
Merry Maid	do	25	4½	20	
Frigate	do	16½	4	12	
Knox					
Joclyn					
Sunshine					
Audrey					
Alice					
Spray					
Dixie					
Emma					
Virginia					
Marjorie					
Liberty					
Ferro					
Grace II					
Vendetta					
It					
Imp					
Carp					
Helper					

Muskingum River leases.

Dam No.	Location.	Lessee.	Dated.	Expires.
		Year ending April 30, 1910.		
1	Marietta	The Phoenix Mill Co	May 1, 1904	May 1, 1924
3	Lowell	Rechsteiner Brothers and J. S. Brown [a]	May 1, 1890	May 1, 1910
	do	Rechsteiner Brothers [a]	do	Do.
	do	do	Nov. 1, 1892	Nov. 1, 1912
	do	F. H. Wolfram [b]	Dec. 2, 1879	Dec. 15, 1909
	do	First National Bank [b]	June 1, 1900	Do.
	do	E. W. Webster	do	June 6, 1912
4	Beverly	Langenberg & Abrams [a]	May 1, 1890	May 1, 1910
	do	T. F. Lowe [a]	do	Do.
	do	George Walker	May 1, 1901	May 1, 1921
6	Stockport	J. S. Torbert	Oct. 25, 1905	Nov. 1, 1925
7	McConnelsville	E. M. Stanbery	Sept. —, 1839	
	do	McConnelsville-Malta Electric Co	Nov. 1, 1890	Nov. 1, 1920
7	Malta	Ohio and Little Kanawha R. R. Co	May 1, 1890	May 1, 1925
9	Duncans Falls	John Miller	Dec. 31, 1836	
9	Taylorsville	Frazier & Son	do	
	do	Chas. U. Shryock	May 1, 1909	May 1, 1914
	do	do	Dec. 9, 1905	Nov. 1, 1925
10	Zanesville	John T. Drone [a]	May 1, 1899	May 1, 1910
	do	The Ohio Electric Railway Co.:		
		1	May 1, 1909	June 30, 1923
		2 [c]	May 1, 1890	May 1, 1910
		3	July 1, 1903	June 30, 1923
	do	Muskingum Coffin Co. [a]	May 1, 1890	May 1, 1910
	do	Zanesville Mantel and Furniture Co. [a]	do	Do.
	do	T. L. Moorehead	May 1, 1893	May 1, 1913
	do	Muskingum and Ohio River Transportation Co.	Nov. 1, 1908	Nov. 1, 1913
		Year ending May 31, 1910.		
10	Zanesville	The Zanesville Pure Milk Co. [d]	June 1, 1909	June 1, 1919
	do	Frederick Abel estate	do	Do.

[a] New lease granted for ten years from May 1, 1910.
[b] New lease granted for ten years from December 16, 1909.
[c] New lease granted for thirteen years from May 1, 1910.
[d] Lease transferred from John Blankenbuhler August 9, 1908.

Muskingum River rentals from leases of land and water power.

Lessee.	Land or water power.	Cubic feet of water per minute.	Annual rental.	Rentals collected.
The Phoenix Mill Co	Water power	12,000	$300.00	$300.00
Rechsteiner Brothers and J. S. Brown	do	7,280	174.72	174.72
Rechsteiner Brothers	do	4,446	106.70	106.70
Do	Land		10.00	10.00
F. H. Wolfram	do		[a] 5.00	2.70
Do	do		[b] 48.00	24.00
First National Bank	do		[a] 10.00	5.41
Do	do		[b] 48.00	24.00
E. W. Webster	do		5.00	5.00
Langenberg & Abrams	Water power	5,600	114.24	114.24
T. F. Lowe	do	6,033	109.80	109.80
George Walker	do	5,000	100.00	100.00
J. S. Torbert	do	7,315	263.34	263.34
E. M. Stanbery [c]	do	([d])		
McConnelsville-Malta Electric Co	do	8,702	208.84	208.84
Ohio and Little Kanawha Railroad Co	Land		2.50	2.50
John Miller [c]	Water power	([e])		
Frazier & Son [c]	do	([e])		
Chas. U. Shryock	Land		25.00	25.00
Do	do		32.00	32.00
John T. Drone	Water power	7,560	453.60	453.60
The Ohio Electric Railway Co	do	6,718	748.08	748.08
Do	do	6,020	361.74	361.74
Do	do	50,309	841.28	841.28
Muskingum Coffin Co	do	4,619	207.86	207.86
Zanesville Mantel and Furniture Co	do	4,794	186.96	186.96
T. L. Moorehead	Land		25.00	25.00
Muskingum and Ohio River Transportation Co	do		25.00	25.00
The Zanesville Pure Milk Co	Water power	2,534	299.51	299.51
Frederick Abel estate	do	4,589	373.82	373.82
Total				5,031.10

[a] Old lease.
[b] New lease.
[c] Perpetual free lease of water power.
[d] Enough to propel 10 run of 4-foot 5-inch millstones.
[e] Enough to propel 15 run of 4½-foot millstones.

GG 3.

IMPROVEMENT OF BIG SANDY RIVER, WEST VIRGINIA AND KENTUCKY, AND TUG AND LEVISA FORKS OF SAME.

The natural condition of this river and its forks and projects for their improvement are given in the current summary. No work under improving appropriations was done on the main river.

Lock No. 1, Tug Fork.—Under contract with the Ohio River Contract Company, dated July 22, 1908, for constructing dam, guide walls, etc., at this lock, the lower guide wall, fitting and adjustments of lock gates, and walks, etc., at dwelling, were completed, and the navigable pass, center pier, weir, and paving behind abutment constructed. All contract work for which direct payment was made was completed December 28, 1909. The work of removing remains of cofferdams, waste piles of excavated materials, and clearing of site as far as practicable until the contractor's plant and temporary buildings are removed, was completed April 12, 1910.

The following is a statement of the work done under this contract during the year:

Classification.	Units.	Quantities.	Rate.	Amount.
Earth excavation	Cubic yards	7,860	$0.60	$4,716.00
Rock excavation	do	5	2.00	10.00
Embankment	do	1,004	.50	502.00
Concrete	do	4,167	5.00	20,835.00
Piling, round	Linear feet	1,050	.40	420.00
Timber	M feet b. m	12,000	60.00	720.00
Lumber	do	25,735	80.00	2,058.80
Iron and steel	Pounds	198,610	.07	13,902.70
Cement	Barrels	4,189	1.50	6,283.50
Cistern	Number	1	100.00	100.00
Skilled labor	Hours	182	.50	91.00
Unskilled labor	do	119	.25	29.75
Timber used over	M feet b. m	2,667	36.00	96.01
Total				49,764.76

Lock No. 1, Levisa Fork.—Under contract with James Skene & Sons, dated July 29, 1908, for constructing dam, guide walls, buildings, etc., at this lock, the reenforcement of lock gates and construction of lower guide wall were completed, and the navigable pass, center pier, weir, and reenforced-concrete paving on both sides of river, constructed. All contract work for which direct payment was made was completed December 31, 1909, and the work of removing cofferdams, plant, temporary buildings, and clearing the site was completed January 12, 1910.

The following is a statement of work done under this contract during the year:

Classification.	Units.	Quantities.	Rate.	Amount.
Earth excavation	Cubic yards	6,884.0	$0.75	$5,163.00
Rock excavation	do	119.6	3.00	358.80
Embankment	do	1,073.0	.35	375.55
Concrete	do	4,577.7	5.00	22,888.50
Piling, round	Linear feet	1,425.0	.50	712.50
Timber	M feet b. m	21,077.0	50.00	1,053.85
Lumber	do	26,328.0	80.00	2,106.24
Iron and steel	Pounds	229,768.0	.08	18,381.44
Cement	Barrels	4,755.0	1.50	7,132.50
Removing lock cofferdam	Lump sum	(a)	1,800.00	600.00
Drains	Linear feet	40.0	.50	20.00
Skilled labor	Hours	628.0	.50	314.00
Unskilled labor	do	649.0	.25	162.25
Timber used over	M feet b. m	26,159.0	30.00	784.77
Total				60,053.40

[a] One-third completed.

The construction of an upper guide wall at Lock No. 1, Levisa Fork, and of several buildings, considerable filling behind walls, with protecting paving and excavating approaches to the locks, at both Lock No. 1, Tug Fork, and Lock No. 1, Levisa Fork, were omitted from the contracts for the dams, guide walls, etc., sufficient funds not being available for the completion of the work, and the omission of those items being provided for in the contracts.

Large deposits of sand and mud continue to form during every freshet in the locks, approaches thereto, and on the dams, often delaying navigation for several days at a time while the deposits are being removed with scrapers, force pumps, and by flushing, so that the locks can be operated and dams raised. It is anticipated that great trouble from this cause will be experienced at the recently constructed locks on Tug and Levisa forks. The river bed between the locks is filling up from year to year, high sand bars extend entirely across the river, and these bars are not channeled at low water, as was the case before the movable dams were put into operation. With sufficient water on the miter sills of locks for boats of 5 to 6 feet draft, navigation for boats of less than 2 feet draft is often suspended for two or three days while the dams are being raised and deposit removed. For the foregoing reasons the dredging plant, previously recommended, would be of great value to the work for rapidly removing deposits at the locks, thereby decreasing the delay to navigation caused by the present slow methods, and it is probable that narrow channels could be cut through the higher bars so that navigation for light-draft boats could continue during the raising of the dams and filling of the pools.

Commercial statistics are reported under head of "Operating and care," etc.

Inasmuch as the river and harbor act of June 25, 1910, appropriated $100,000 for Lock No. 2 on Tug Fork and Lock No. 2, Levisa Fork, it is estimated that $400,000 should be appropriated or authorized to provide for completion of these locks.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $150,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

July 18, 1878	$12,000.00	March 3, 1901	$140,000.00
March 3, 1879	12,000.00	June 13, 1902	178,000.00
June 14, 1880	55,000.00	March 3, 1903	50,000.00
March 3, 1881	50,000.00	March 3, 1905 (river and harbor)	43,000.00
August 2, 1882	25,000.00	March 3, 1905	85,000.00
July 5, 1884	50,000.00	June 30, 1906	40,000.00
August 5, 1886	30,000.00	March 2, 1907	107,000.00
August 11, 1888	31,500.00	May 27, 1908	85,000.00
September 19, 1890	36,000.00	March 4, 1909	50,000.00
July 13, 1892	55,000.00	June 25, 1910	153,000.00
August 18, 1894	45,000.00	Received from other sources	1,837.57
June 3, 1896	33,000.00		
March 3, 1899	52,500.00		
June 6, 1900	280,000.00		
June 6, 1900 (allotted)	2,000.00	Total	1,701,837.57

The appropriations are shown in the above form for the reason that the figures given in House Document No. 421, Fifty-seventh Congress, second session, are in conflict with the status of the appropriations as shown by the records of this office.

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACTS IN FORCE.

CONTRACT FOR CONSTRUCTING DAM NO. 1, ETC., TUG FORK OF BIG SANDY RIVER, WEST VIRGINIA AND KENTUCKY.

Name of contractor: The Ohio River Contract Company.
Date of approval: August 10, 1908.
Date of beginning: Within twenty days after the date of notification of approval of the contract by the Chief of Engineers, U. S. Army.
Date of expiration: December 31, 1909.

Items.		Contract price (unit rate).
Earth excavation	cubic yard	$0.60
Rock excavation	do	2.00
Embankment	do	.50
Concrete	do	5.00
Piling, round	linear feet	.40
Piling, sheet	do	.60
Timber	M feet b. m.	60.00
Lumber	do	80.00
Iron and steel	pound	.07
Cement	barrel	1.50
Dwellings	each	2,500.00
Outbuildings	do	200.00
Cisterns	do	100.00
Office		300.00
Drains	linear feet	.40
Skilled labor	hour	.50
Unskilled labor	do	.25

Completed.

CONTRACT FOR CONSTRUCTING DAM, GUIDE WALLS, DWELLINGS, ETC., AT LOCK NO. 1, LEVISA FORK OF BIG SANDY RIVER, WEST VIRGINIA AND KENTUCKY.

Name of contractor: James Skene & Sons.
Date of approval: August 12, 1908.
Date of beginning: Within twenty days after the date of notification of approval of the contract by the Chief of Engineers, U. S. Army.
Date of expiration: December 31, 1909.

Items.		Contract price (unit rate).
Earth excavation	cubic yard	$0.75
Rock excavation	do	3.00
Embankment	do	.35
Concrete	do	5.00
Piling, round	linear feet	.50
Timber	M feet b. m.	50.00
Lumber	do	80.00
Iron and steel	pound	.08
Cement	barrel	1.50
Removing lock cofferdam		1,800.00
Dwellings	each	2,317.00
Outbuildings	do	90.00
Cisterns	do	65.00
Office		288.00
Drains	linear feet	.50
Skilled labor	hour	.50
Unskilled labor	do	.25

Completed.

G G 4.

OPERATING AND CARE OF LOCKS AND DAMS ON THE BIG SANDY RIVER, WEST VIRGINIA AND KENTUCKY.

Under an allotment from the indefinite appropriation for the care of canals and other works of navigation there has been expended during the year $15,048.32.

Thus far the system comprises three locks and movable dams located on the main river between Catlettsburg and Louisa, Ky., and slack-water navigation was generally maintained throughout the year whenever a low stage of water would have made open-river navigation impracticable without the dams except suspensions at times when the dams were being raised, for reasons given under head of "Improvement of Big Sandy River," etc. Navigation between Lock No. 1 at Catlettsburg, Ky., and the Ohio River was suspended because of low water below the dam for one hundred and two days, and on account of dangerous currents below the dam for four days. Navigation on the main river above Lock No. 1 was suspended for fifty-seven days on account of delays in opening locks due to deposits, ice preventing the raising of the dams during low water, and repairs to a maneuvering boat.

OPERATIONS DURING THE FISCAL YEAR.

The following work, in addition to ordinary lock operations, maneuvering of dams, and care and upkeep of property and grounds, was done during the year:

Lock No. 1, main river.—The washing away of a part of the old crib work below the abutment and consequent erosion of river bank necessitated temporary repairs with paving stone and riprap on hand at a cost of $179.71, of which $178.46 was for labor and $1.25 for material. New fire fronts and burners were placed in dwellings at a cost of $10.50, of which $2 was for labor and $8.50 for material. A kitchen was plastered at a cost of $6 for labor and material. Appliances were placed for holding gates into recesses at a cost of $13.20 for labor. Minor repairs to dam, valves, and drains cost $14.10 for labor. Total cost of minor repairs, $223.51.

Lock No. 2, main river.—Chandeliers costing $25.25 and fly screens costing $24.95 were placed in middle dwelling, and minor repairs made to outbuildings, lock and dam, cost $24.32 for labor; a total of $74.52.

Lock No. 3, main river.—A reenforced concrete landing with steps, containing 28 cubic yards, was constructed at foot of lock, costing $50.88, of which $43.38 was for labor and $7.50 for material. Lumber, amounting to 448 feet b. m., was purchased for walks on dam at a cost of $17.92. Tripping-bar machinery on pier and abutment was repaired at a cost of $52.75 for new gear wheels. Paving behind and below abutment was repaired at a cost of $25.20 for labor. Material to repair shops and gas engine cost $9.18. Miscellaneous minor repairs cost $2.80 for labor; total cost of minor repairs for the year was $158.73.

A set of special needles with openings for regulating the pool, a sheave car for operating the weir, winches for weir and incline, and many minor repairs and convenient appliances were made from material on hand by the regular employees.

A saw bench, chain vise, hangers, belts, pulleys, and small tools for use in machines were purchased at a cost of $206.23, and a drill press to cost $299.20 was ordered and is being constructed.

The following new plant was purchased during the year: Push boat *Louisa No. 1*, under contract, dated March 14, 1910, with Evans and Justice, Louisa, Ky., at a cost of $124.50. One new pump with hose and fittings for use in cleaning deposits from lock gates, walls, etc., at a cost of $329.29.

No snagging or clearing the river, other than could be done by the launch and regular employees, was necessary, except the removal of part of a reef of loose rock in the head of Pool No. 2, where about 20 cubic yards of stone was removed at a cost of $9.60 for labor.

FLOATING PLANT.

Launch Pioneer.—This gasoline motor boat was usefully employed throughout the year making inspection trips, delivering supplies at the several locks, and in doing light towing. Minor repairs were made to her machinery, and her hull and cabin were painted and varnished. Cost of repairs, $38.69, of which $10.80 was for labor and $27.89 for material. Total miles run during the year, 1,574.5.

Catlettsburg No. 1.—This maneuvering boat was used for maneuvering the dam, repair work, and removing deposit at Lock No. 1. Minor repairs were made to boiler, engine, and pump at a cost of $20.53 for material, of which $10 was for a new stack and hood.

Kavanaugh No. 1.—This maneuvering boat was used for maneuvering the dam and removing deposit at Lock No. 2. Minor repairs were made to boiler, engine, and pump at a cost of $54.21 for material, of which $6.15 was for new grate bars, $9.94 for new stack and hood, and $30.34 for new set of boiler tubes.

Louisa No. 2.—This maneuvering boat was used for maneuvering the dam and repair work at Lock No. 3. Minor repairs were made to engine and wood work amounting to $13.95, of which 36 cents was for labor and $13.59 for material.

Louisa No. 1 (old).—This needle boat being useless as a boat was wrecked and usable material and machinery saved.

Louisa No. 3.—This push boat was used in connection with operations at Lock No. 1, and was kept in repair by the regular employees.

Kavanaugh No. 2.—This push boat was used in connection with operations at Lock No. 2, and was kept in repair by the regular employees.

Louisa No. 1 (new).—This push boat was used in connection with operations at Lock No. 3. Having been recently purchased, no labor or material was expended in repairs.

Survey No. 3.—This push boat was used in connection with operations at Lock No. 3 until it became unserviceable, when it was beached to await condemnation.

Summary of expenditures for operating and care of locks and dams on Big Sandy River, West Virginia and Kentucky, for the fiscal year ending June 30, 1910.

Services (including superintendence and inspection)	$11,669.50
Materials (including contract work)	772.47
New plant	453.79
Fuel	139.11
Supplies	492.92
Miscellaneous expenses	520.53
Administration (main office)	1,000.00
Total	15,048.32

ALLOTMENTS.

July 23, 1897	$2,840.00	July 28, 1906	$16,015.19
July 23, 1898	3,250.95	March 1, 1907	13,700.00
July 19, 1899	3,524.28	July 8, 1907	34,435.85
July 18, 1900	3,177.09	August 1, 1907	1,925.00
July 10, 1901	3,658.12	July 16, 1908	19,728.64
July 17, 1902	5,075.88	July 13, 1909	12,954.91
July 18, 1903	2,677.98	Received from other sources	8.75
July 11, 1904	2,950.48		
October 31, 1904	1,650.00	Total	145,303.39
July 31, 1905	12,780.27		
March 14, 1906	4,950.00		

NOTE.—Figures given in House Document No. 421, Fifty-seventh Congress, second session, are in conflict with the above figures.

CONTRACTS IN FORCE.

CONTRACT (EMERGENCY) FOR CONSTRUCTING AND DELIVERING PUSH BOAT FOR USE ON BIG SANDY RIVER, WEST VIRGINIA AND KENTUCKY.

Name of contractor: Evans & Justice.
Date of contract: March 14, 1910.
Approval of contract: (Emergency contract).
Date of beginning and date of expiration: Within ten days after date of receipt of one number of contract and complete same on or before May 31, 1910.

Item.	Contract price.
For constructing and delivering push boat for use on Big Sandy River, West Virginia and Kentucky	$124.50

Completed.

COMMERCIAL STATISTICS, 1910.

Season of navigation.—Opened, July 1, 1909; closed, June 30, 1910.

Vessel classification.

Class.	Number.	Net registered tonnage.	Passengers.
Steamers:			
Towboat	17	400.44	10,118
Packet	3	178.65	
U. S. launch Pioneer	1	4.00	....
Gasoline launches	6	....	....
Rafts	2,556	....	....
Total	2,583	583.09	10,118

Freight traffic.

Article.	Unit.	Amount.	Short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
					Miles.	
Brick	Number	7,465	22	$75	15	$0.12
Cattle	Head	197	89	8,865	15	.18
Cement	Barrels	103	21	124	15	.05
Corn	Bushels	5,281	158	3,433	15	.10
Eggs	Cases	1,060	40	7,950	15	.20
Flour	Barrels	989	108	5,934	15	.08
Grain	Bushels	2,087	63	2,087	15	.10
Hay	Tons	25	25	428	15	.10
Hogs	Head	123	12	2,460	15	.18
Horses	do	34	21	4,250	15	.18
Iron, manufactured	Pounds	160,000	80	4,800	15	.10
Lime	Barrels	90	10	113	15	.08
Lumber	Feet b. m	44,100	88	1,544	15	.10
Oil	Barrels	521	104	2,345	15	.08
Produce	Pounds	63,050	33	2,522	15	.10
Salt	Barrels	892	134	803	15	.07
Stoneware	Gallons	4,546	23	455	15	.20
Wheat	Bushels	2,241	67	2,800	15	.10
Miscellaneous merchandise	Tons	679	679	33,930	15	.10
Cross-ties	Number	213,877	26,735	128,326		
Timber	Cubic feet	4,967,200	119,213	2,326,200		
Total			147,725	2,539,444		

List of boats plying Big Sandy River, West Virginia and Kentucky.

Name of boat.	Character.	Length.	Breadth.	Draft.	Tonnage.
		Feet.	*Feet.*	*Feet.*	
Crown Hill [a]	Towboat	135.00	23.00	3.50	120.85
Sea Lion [a]	do	123.00	22.00	3.50	127.00
Mildred Runyon [b]	do	70.50	11.50	1.67	13.00
Teddy [a]	do	67.00	12.25	1.25	14.50
Greenbrier [a]	do	59.00	7.00	1.50	
Little Bill [a]	do	59.00	7.00	1.50	
Sampson [a]	do	58.00	12.00	2.00	13.00
Hazel [a]	do	57.00	12.00	1.33	13.00
Polly [a]	do	57.00	12.00	1.67	13.00
Chester [a]	do	56.00	9.00	1.50	
Gilbert Lee [b]	do	56.00	8.00	1.50	
Annie M. Shaw [a]	do	55.90	11.00	1.83	12.00
Clarion [a]	do	55.00	10.00	2.00	9.00
Gordon Nigh [a]	do	55.00	8.83	2.50	
Eureka [a]	do	49.00	11.25	2.08	7.00
Marie [a]	do	47.00	8.00	1.17	8.00
Hustler [b]	do	36.50	7.00	1.08	
Geraldine [b]	Packet	132.00	20.50	2.67	74.65
Thealka	do	116.00	19.20	3.20	45.00
Enquirer	do	94.50	20.70	2.40	59.00
Pioneer	U. S. launch	35.00	8.50	1.17	4.00
Leader	Launch	23.33	4.50	1.58	
Pearl	do	23.00	4.25	2.00	
Charles W	do	21.00	4.17	1.50	
Lenora	do	20.17	4.67	1.33	
Maggie B	do	20.00	3.83	1.67	
Clara	do	18.33	3.75	1.41	

[a] Harbor boats at mouth of river.

[b] Occasional trips on main river.

G G 5.

IMPROVEMENT OF KENTUCKY RIVER, KENTUCKY.

The natural condition of this work and projects for its improvement are described and reference for more extended information given in the current summary.

OPERATIONS DURING THE FISCAL YEAR.

Lock and Dam No. 12.—Under contract with the Ohio River Contract Company, dated June 22, 1907, for constructing this lock and dam, excavation was completed for river wall of lock, miter sills, three piers at head of river wall, dam, and 130 feet of lower guide wall, which includes 30 feet of lower wing. The river wall of the lock, together with the miter sills, tile gauge, and all metal work pertaining to the lock (including steel lock gates) was completed, thus completing the lock in every detail ready for operation. The three piers at head of river wall, 100 linear feet of lower guide wall, and about 31 per cent of all masonry in wing of lower guide wall were completed. Cofferdam inclosing the dam was constructed and all masonry in the dam was completed, including 30 per cent of all iron required for movable crest. Paving on the left bank in rear of abutment and protection walls was completed, together with about 70 per cent of all paving required on the right bank on lock side. The riprap dike in rear of abutment core wall was practically completed. Embankment amounting to about 20 per cent of the total required for completed work was placed.

Under contract with Augustus Snyder, of Louisa, Ky., dated March 4, 1910, for constructing one frame dwelling, etc., the work, at the close of the year, is about 80 per cent completed. This contract included all necessary excavation, concrete and drains, construction of cistern, and the moving of office building to a new location.

The following is a statement of the work done under the lock and dam contract during the year:

Classification.		Quantities.	Rate.	Amount.
Earth excavation	cubic yards	20,331	$0.35	$7,115.85
Rock excavation	do	150	2.00	300.00
Embankment	do	11,367	.47	5,342.49
Ballast	do	1,269	1.35	1,713.15
Concrete	do	16,477.87	5.00	82,389.35
Paving	do	1,465.38	6.50	9,524.97
Derrick stones	tons	271	2.50	677.50
Riprap	square yards	442	2.50	1,105.00
Cement	barrels	18,526	2.40	44,462.40
Timber	feet b. m.	10,892	.10	1,089.20
Shoring	do	6,425	.10	642.50
Shoring (2d use)	do	13,824	.06	829.44
Iron and steel	pounds	267,244	.075	20,043.30
Gauges	linear feet	44.5	2.00	89.00
Drains	do	192	.45	86.40
Skilled labor	hours	50.5	.30	15.15
Total				175,425.70

Lock and Dam No. 13.—Under date of May 14, 1909, a contract was entered into with Smith, Towles & Co., of Roderfield, W. Va., for the construction of the lock, lock gates, dwellings, etc. During the year the upper guide and wing walls and the land wall of the lock were completed; the lower wing wall was about 75 per cent completed; excavation for the lower guide wall was about 50 per cent completed. Nearly 25 per cent of the gross material excavated was utilized as embankment behind the upper guide and land walls. The dwellings, with outbuildings, cisterns, well, walks, etc., were completed.

The following is a statement of the work done under this contract during the year:

Classification.	Quantities.	Rate.	Amount.
Earth excavation.....cubic yard..	63,329	$0.44	$27,864.76
Rock excavation.....do....	57	1.50	85.50
Embankment.....do....	15,594	.30	4,678.20
Ballast.....do....	90	1.50	135.00
Concrete.....do....	13,031	4.20	54,730.20
Paving.....do....	89	6.00	534.00
Cement.....barrels..	13,448	2.10	28,240.80
Shoring.....feet b. m..	54,519	50.00	2,725.95
Shoring, second use.....do....	13,142	30.00	394.26
Iron and steel.....pounds..	23,106	.06	1,386.36
Drains.....linear foot..	891	.75	668.25
Dwelling (2-story).....number..	1	2,000.00	2,000.00
Dwellings (1-story).....do....	2	1,500.00	3,000.00
Outbuildings.....do....	3	500.00	1,500.00
Office building.....do....	1	800.00	800.00
Cisterns.....do....	3	100.00	300.00
Well.....linear feet..	86	2.00	172.00
Total.....	.....	.....	129,217.28

Commercial statistics are given in the report for operating and care of locks and dams on the Kentucky River, Kentucky.

Certain bridges and public highways crossing the small streams that enter into this river have been more or less damaged by reason of this improvement. The communities in which these damages have occurred are no doubt entitled to some relief, but it is believed that the entire cost of providing suitable bridges or relocating roadways should not be borne by the United States. The people are greatly benefited by the work of river improvement executed by the United States and should bear an equitable share of the local damages resulting therefrom. The following instances of such damage, due to the construction of Lock and Dam No. 12, Kentucky River, are cited:

(*a*) A county road leads, by means of a ford, across Millers Creek, a tributary of Kentucky River, about 1 mile above the mouth; this road at the place of crossing has been completely submerged and destroyed by backwater caused by the maintenance of Lock and Dam No. 12, one of a series of such structures built by the United States for the improvement of navigation.

It is estimated that a suitable bridge can be built and the highway restored for not exceeding the sum of $4,000. It is recommended, therefore, that if the county authorities decide to construct a bridge at this locality the sum of $4,000 or so much thereof as may be necessary, be contributed by the United States for that purpose.

(*b*) A county road leads by means of a ford across Station Camp Creek, a tributary of Kentucky River, at a point known as Hulins Ford, about 2½ miles from where it enters the river. Backwater, caused by the maintenance of Lock and Dam No. 11 has practically destroyed the ford referred to, making the erection of a bridge necessary to the continuance of the public highway. Investigation proves, however, that the ford is rendered impassable for considerable periods by natural causes, and that while backwater from No. 11 increases the low-water depth from nothing to about 3 feet, it does not entirely destroy the ford or prevent the use of the highway. While it is believed the community is entitled to some relief, it is not believed that the entire cost of providing a suitable bridge should be borne by the United States.

It is estimated that a suitable bridge can be built for not exceeding $4,000, and if the county authorities should make provision for a bridge at the locality it is believed an equitable arrangement would be for the Government to bear one-half of the cost.

The project for the improvement of the river provides for 14 locks and dams; 11 locks and dams have been completed; Lock and Dam No. 12 will be completed during the coming season; Lock No. 13 is under contract; proposals for the construction of Dam No. 13 will be invited within the next thirty days, and it is believed advisable to complete the system by the construction of Lock and Dam No. 14, which will carry slack water to Beattyville, the junction of the three forks, when it is hoped that coal field will be developed and the coal shipped by river, which is the main object of this improvement.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $165,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

March 3, 1879	$100,000.00	June 6, 1900	$75,000.00
June 14, 1880	100,000.00	March 3, 1901	150,000.00
March 3, 1881	125,000.00	June 28, 1902	200,000.00
August 3, 1882	225,000.00	March 3, 1903	200,000.00
July 5, 1884	250,000.00	March 3, 1905	50,000.00
August 5, 1886	187,500.00	March 2, 1907	100,000.00
August 11, 1888	180,000.00	March 4, 1907	75,000.00
September 19, 1890	180,000.00	May 27, 1908	99,000.00
July 13, 1892	150,000.00	May 27, 1908	210,000.00
August 18, 1894	125,000.00	March 4, 1909	210,000.00
June 3, 1896	50,000.00	June 25, 1910	106,000.00
June 3, 1896	83,000.00	Received from sales, etc.	7,997.43
June 4, 1897	200,000.00		
July 1, 1898	350,000.00	Total	3,788,497.43

CONTRACTS IN FORCE.

CONTRACT FOR BUILDING LOCK AND DAM NO. 12, KENTUCKY RIVER, KENTUCKY.

Name of contractor: The Ohio River Contract Company.
Date of contract: June 22, 1907.
Approval of contract: July 6, 1907.
Date of beginning and date of expiration: Within twenty days after date of notification of approval of contract and complete same on or before November 30, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

Item.	Contract price (unit rate).
Earth excavation . . . cubic yard	$0.35
Rock excavation . . . do	2.00
Embankment . . . do	.47
Ballast . . . do	1.35
Concrete . . . do	5.00
Paving . . . do	6.50
Derrick stones . . . ton	2.50
Riprap . . . square yard	2.50
Cement . . . barrel	2.40
Timber . . . M feet b. m.	100.00
Shoring . . . do	100.00
Iron and steel . . . pound	.075
Gauges . . . linear foot	2.00
Drains . . . do	.45
Fencing . . . do	.20

CONTRACT FOR BUILDING LOCK NO. 13, KENTUCKY RIVER, KENTUCKY, WITH DWELLINGS, OUTHOUSES, CISTERNS, AND OFFICE BUILDING.

Name of contractor: Smith, Towles & Co.
Date of contract: May 14, 1909.
Approval of contract: June 1, 1909.
Date of beginning and date of expiration: Within ten days after the date of receipt by him of notification of approval of contract and complete same on or before December 31, 1910.

Item.	Contract price (unit rate).
Earth excavation . . . cubic yard	$0.44
Rock excavation . . . do	1.50
Embankment . . . do	.30
Ballast . . . do	1.50
Concrete . . . do	4.20
Paving . . . do	6.00
Derrick stone . . . ton	1.50
Riprap . . . square yard	1.75
Cement . . . barrel	2.10
Timber . . . M feet b. m.	90.00
Shoring . . . do	50.00
Iron and steel . . . pound	.06
Gauges . . . linear foot	1.00
Drains . . . do	.75
Dwelling (2-story)	2,000.00
Dwellings (1-story) . . . each	1,500.00
Outbuildings . . . do	500.00
Office building	800.00
Cisterns . . . each	100.00
Well . . . linear foot	2.00
Fencing . . . do	.90

CONTRACT FOR CONSTRUCTING ONE FRAME DWELLING, ONE FRAME OUTBUILDING, ONE CISTERN, ETC., AT LOCK NO. 12, KENTUCKY RIVER.

Name of contractor: Augustus Snyder.
Date of contract: March 4, 1910.
Date of approval: (Emergency).
Date of beginning and date of expiration: To begin within ten days after receipt of one number of contract; expires July 31, 1910.

Items.	Contract price.[a]
Excavation	$225
Concrete	540
Drains	175
Dwelling (above foundation)	2,100
Cistern, complete, including pump, etc	150
Moving office building	50

[a] For job.

GG 6.

OPERATING AND CARE OF LOCKS AND DAMS ON KENTUCKY RIVER, KENTUCKY.

Under allotment from the indefinite appropriation for operating and care of locks and dams and other works of navigation there has been expended during the year the sum of $159,644.20.

The system comprises 12 locks and fixed dams, Dams Nos. 11 and 12, however, having movable crests. Lock No. 12 was put into operation January 13, 1910, but at the close of the fiscal year the movable crest had not been completed.

The maximum draft which can be carried at pool level over the shoalest points is about 5.2 feet. The shoalest points are the lower sills at Locks Nos. 6 and 7.

The usual variations of level of water surface are from 25 to 40 feet, with an occasional greater variation.

The river is navigable the year round in the improved portion of the Kentucky River for steamers and other craft from the mouth to Lock No. 13, a distance of about 240 miles. Rafts and logs are brought down from the headwaters of the river 120 miles or more above Lock No. 13.

There has been no decided change in the volume of commerce. When the improvement is carried to the head of the river, which is at Beattyville, Ky., the junction of the forks, it is hoped that some coal lands may be developed and some coal shipped by river.

The following work, in addition to the ordinary lock operation, was done during the year:

Lock and Dam No. 1.—Completed construction of 272.5 linear feet of apron; 2,371 yards of riprap stone filling, 122,000 feet of timber, and 1,037 yards of concrete were used in this work.

Cost of materials	$10,949.17
Cost of labor	5,957.13

The old wooden upper and lower miter sills were removed and rebuilt in concrete; 80 yards of concrete were used in the upper sill and 75 yards of concrete in the lower sill.

Cost of materials	$612.80
Cost of labor	1,642.32

During the reconstruction of the lower miter sill the old wooden gates, which were in a very dilapidated condition, were removed and new steel gates installed.

Cost of materials	$3,853.79
Cost of labor	705.89

Under formal contract dated May 6, 1909, with the Penn Bridge Company, of Beaver Falls, Pa., steel lower lock gates for Lock No. 1, Kentucky River, Kentucky, were constructed at a cost of $3,818.65.

Under minor repairs new steel racks were purchased for the operating machinery to lock gates and the lock gates were painted.

Cost of materials	$56.15

While the Ohio River was low, in June, an unusually high rise occurred in the Kentucky River, and the water pouring over the upper abutment crib cut out and washed away the backfilling. This crib is now being raised 6 feet, and is to be backfilled with heavy clay and the filling protected by riprap.

Lock and Dam No. 2.—Minor repairs were made to the upper guard wall, which was in a very dilapidated condition.

Cost of materials	$163.75

Ten rooms were papered in the lock master's house.

Cost of labor and materials	$70.20

Lock and Dam No. 3.—Under minor repairs lumber and material have been purchased for repairs to a stable.

Cost of materials	$183.61

Lock and Dam No. 4.—Rebuilt dam with concrete saddle about 3 feet in thickness. In constructing the saddle above the crest of the dam the upper slope was inclosed by an earth cofferdam; 3,914 yards of concrete were used in this work.

Cost of materials	$9,404.68
Cost of labor	11,003.65

The lower guard wall was rebuilt in concrete above pool level; 755 yards of concrete were used in this work.

Cost of materials	$2,303.03
Cost of labor	1,648.45

Under minor repairs temporary repairs were made to the upper guard and guide walls, which were in a very dilapidated condition, using 7,583 feet of timber on hand.

Cost of materials	$60.88
Cost of labor	175.87

Lock and Dam No. 5.—Renewed worn-out and torn-off sheeting on dam; used about 4,000 feet b. m. 10-inch by 10-inch timber on hand.

Cost of materials	$40.00
Cost of labor	32.81

Constructed 1,400 linear feet of wire fence inclosing government grounds on abutment side of river.

Cost of materials	$78.05
Cost of labor	51.00

Materials were purchased for a new stable, which is to be constructed by the regular force.

Cost of materials	$150.00

Under minor repairs 13 rooms in the lock houses were papered and lumber was purchased for repairs to porch.

Cost of labor and materials	$121.12

Lock and Dam No. 6.—The remains of the old lower guard crib were removed to 1 foot below pool level and reconstructed in concrete. Five hundred and ninety-six yards of concrete were used in this wall.

Cost of materials	$1,595.03
Cost of labor	1,632.44

Timber and driftbolts were purchased for temporary repairs to lower guide wall. It has since been decided to remove the old wall entirely and construct a concrete wall. The materials purchased for temporary repairs will be used in the construction of new wall.

The above lower guide crib is now being removed, and the removal is about completed.

Cost of materials	$1,127.79
Cost of labor	910.12

Under minor repairs, the roofs of a storehouse and a shed were reshingled and minor repairs made to gate-maneuvering apparatus.

Cost of materials	$141.90
Cost of labor	40.13

Lock and Dam No. 7.—Two lock houses and office building were painted two coats on the outside.

Cost of materials	$74.67
Cost of labor	150.15

Under minor repairs, materials were purchased for repairs to office building. The lock gates were painted.

Cost of materials	$50.03

The two lower wall valves, which had become loose from the shafts, were repaired by the crew of dredge *No. 2*, after pumping out the culverts.

Lock and Dam No. 8.—Toward the proposed construction of apron to dam, some cement and form lumber have been purchased, but, owing to the continued high water this spring, no work has been done.

Cost of materials	$687.52
Cost of labor	61.60

Under minor repairs, a 30-foot section of the upper slope sheeting to dam was renewed. The metal roofs of lock houses were painted. The lock gates were painted.

Cost of materials	$45.00

Lock and Dam No. 9.—The bank at lower end of lock grounds for a distance of 300 feet was sloped off and covered with riprap. About 1,395 yards of riprap stone were quarried and hauled for this work.

Cost of materials	$76.70
Cost of labor	1,414.56

Two lock houses and office building were painted two coats on the outside.

Cost of materials	$79.17
Cost of labor	150.15

Constructed about 1,320 feet of wire fence, inclosing the tract of land purchased from O. T. Soper.

Cost of materials	$78.05
Cost of labor	55.50

Under minor repairs, the dwelling house purchased from O. T. Soper was shingled and minor repairs made to porches, etc.

Six rooms in lock houses were papered.

Cost of materials	$160.54
Cost of labor	52.85

Lock and dam No. 10.—The bank on abutment side of river below Horseford branch, for a distance of about 410 feet, has been sloped off and covered with riprap. About 1,100 yards of riprap stone were quarried and used.

Cost of labor	$1,186.83

About one-half mile of county road within the United States Government line on abutment side of river was macadamized. About 1,200 yards of crushed stone were used on this road.

Cost of labor	$1,620.08

The temporary cement shed on abutment side of river was torn down and the material used for the construction of a storehouse on lock side of river.

Cost of materials	$24
Cost of labor	143

Nine rooms in lock houses were papered at a cost of $81.40.

Under minor repairs 3 yards of concrete were placed under foundation of abutment wall, which was undermined at that point. Minor repairs were made to walks and the inside woodwork of lockman's house was painted.

Cost of materials	$2.40
Cost of labor	53.08

Lock and dam No. 11.—Papered 20 rooms in lock houses and commenced painting 2 lock houses.

Cost of materials	$74.67
Cost of labor	158.55

Constructed cistern for second lockman's house.

Cost of materials	$31.50
Cost of labor	69.45

A needle boat has been built for holding needles for movable crest of dam when lowered.

Cost of materials	$57.75
Cost of labor	177.88

Under minor repairs slight repairs have been made to trestles to movable crest of dam and lumber purchased for new needles. One valve in lower lock gate and two dam valves were repaired by the crew of the steamer *Kentucky*.

Cost of material	$60.39
Cost of labor	29.50

U. S. steamer Kentucky.—This boat was in commission from July 1, 1909, to February 12, 1910, and from March 5, 1910, to the close of the fiscal year has been vigorously employed in removing snags in the river, tending dredges, pumping sand, delivering supplies and materials to the various locks, making inspection trips, removing wrecks, and assisting the repair work.

Number of miles run	5,081.7
Number of snags and stumps pulled	366
Number of overhanging trees cut	257

In March, 1910, the boat was docked at the dock of the Louisville and Portland canal and the wheel raised about 13 inches; the hog chains were tightened.

Cost of materials	$309.97
Cost of labor	152.44

U. S. steamer Gregory.—Under contract dated April 1, 1909, with M. A. Sweeney Shipyard and Foundry Company, this boat was completed and received at Frankfort, Ky., January 24, 1910. The *Gregory* was placed in commission on May 17, 1910, and has been employed as dredge tender and in towing floating plant to points where work was in progress.

Number of miles run	425.1

U. S. dredge No. 1.—This dredge was in commission from July 1, 1909, to January 31, 1910, and from June 2, 1910, to the close of the fiscal year.

During this time the dredge has been employed in dredging channels, removing deposits in lock entrances, backing up cofferdam above Dam No. 4, and assisting in the repair work.

The following is a detailed statement of the work accomplished:

Date.	Amount.	Location.	Pay rolls.
1909.	*Cu. yds.*		
July	2,850	Devils Hollow and Lock No. 4	$463.50
August	11,248	Devils Hollow, Cedar, and Lock No. 4	457.50
September	6,810	Devils Hollow (pool No. 4)	459.00
October	5,560	Lock No. 4 and pool No. 4	465.00
November	530	Lock No. 1	465.00
December	160	do	444.00
Do	75	Lock No. 6	
1910.			
January	275	Lock No. 6	436.50
February		Out of commission	195.00
March		do	195.00
April		do	237.00
May		do	288.50
June	1,280	Lock No. 5	418.33
Do	1,800	Lock No. 6	
	30,588	Total	4,524.33
		Cost of repairs, oils, paints, coal, etc	1,783.40
			6,307.73
		Or an average of $0.2062 per yard.	

During the year a new capstan has been installed, an extra dipper handle constructed, and a new main hoisting-gear wheel installed.

Cost of materials	$1,424.74
Cost of labor	22.50

U. S. dredge No. 2.—This dredge was in commission from July 1, 1909, to January 31, 1910, and from March 16, 1910, to the close of the fiscal year. The work accomplished consisted in removing deposits in lock entrances, removing sand and gravel bars in the river, and assisting the repair work.

The following is a detailed statement of the work done:

Date.	Amount.		Pay rolls.
1909.	*Cu. yds.*		
July	4,520	Lock No. 8	$452.00
Do	200	Lock No. 5	
August	680	Lock No. 1	431.83
September	630	Lock No. 1	395.50
October	725	Lock No. 1	369.00
November	495	Lock No. 1	348.50
December	180	Lock No. 1	
Do	30	Lock No. 4	425.00
1910.			
January	175	Lock No. 4	455.00
February		Out of commission	225.00
March		Out of commission until Mar. 16, 1910	
Do	2,505	Lock No. 6	
Do	320	Lock No. 7	325.50
April	1,520	Lock No. 7	
Do	2,685	Lock No. 5	
Do	1,240	Lock No. 4	
Do	320	Lock No. 3	456.00
May	1,810	Lock No. 3	
Do	2,140	Lock No. 2	
Do	320	Lock No. 1	454.50
June	1,440	Lock No. 1	
Do	1,040	Lock No. 3	
Do	2,400	Lock No. 4	445.00
	25,375	Total	4,782.83
		Cost of repairs, oils, paints, coal, etc	1,014.21
			5,797.04
		Or an average of $0.2284 per yard.	

Minor repairs have been made to the machinery of dredge and the hull has been painted.

Cost of materials	$210.11

U. S. launch Pearl.—This launch was usefully employed throughout the year in making inspection trips, delivering supplies at the several locks, and tending dredges occasionally.

Total miles run	4,002

A new 28-horsepower engine has been installed in the launch and minor repairs made to hull.

Cost of materials	$942.90
Cost of labor	35.15

U. S. derrick boat No. 1.—This boat was employed at the various locks in assisting the repair work.

Minor repairs have been made to the machinery and some of the deck plank renewed.

Cost of materials	$109.21
Cost of labor	97.80

U. S. derrick boat No. 2.—This boat was employed at the various locks in assisting the repair work. Minor repairs have been made to machinery and hull of boat and a new mast and boom have been installed.

Cost of materials	$116.91
Cost of labor	30.00

Barges and dump scows.—Minor repairs were made to barges and scows; the sides and rakes were calked and decayed decking renewed.

Cost of materials	$214.86
Cost of labor	352.58

New plant.—One new concrete mixer was purchased, at a price of $978; a 3-drum hoisting engine was purchased, at a price of $1,097.50; a 35-horsepower boiler was purchased, at a price of $438. Under contract dated January 26, 1910, one wooden barge was purchased, at a price of $2,200.

Hired towboat.—A contract dated August 2, 1909, with Lewis Tanner for hire of towboat was entered into.

Classification.	Days.	Unit price.	Amount.
Towboat	71 2/12	$19.50	$1,387.75

Hired barge.—A contract dated August 9, 1909, with Kenney Brothers Company, for hire of barge, was entered into.

Classification.	Days.	Unit price.	Amount.
Barge	101	$3.00	$303

A contract dated October 7, 1909, with Kosmos Portland Cement Company (Incorporated), for furnishing cement, was entered into.

Classification.	Quantity.	Unit price.	Amount.
	Barrels.		
Cement	1,190¾	$1.56	$1,857.57
Rebate allowed on empty sacks returned			446.90

A contract dated October 7, 1909, with the Kentucky and Ohio Transportation Company, for furnishing gravel, delivered at Frankfort, Ky., was entered into.

Classification.	Quantity.	Unit price.	Amount.
	Yards.		
Gravel delivered at Frankfort, Ky	912	$1.42	$1,295.04

A contract dated January 26, 1910, with the Kanawha Dock Company, for construction of barge, was entered into.

Classification.	Number.	Unit price.	Amount.
Barge	1	$2,200	$2,200

The following is a statement of cement delivered and accepted under the contract dated May 6, 1909, with the Kosmos Portland Cement Company (Incorporated):

Classification.	Quantity.	Unit price.	Amount.
	Barrels.		
Cement	6,398½	$1.56	$9,981.66
Rebate allowed on empty sacks returned			2,513.90

The following is a statement of gravel delivered under the contract dated May 6, 1909, with The Kentucky and Ohio Transportation Company:

Classification.	Quantity.	Unit price.	Amount.
Gravel:	*Yards.*		
Delivered at Frankfort, Ky	1,909	$1.42	$2,710.78
Delivered at Carrollton, Ky	1,069.8	1.23	1,315.85

The following is a statement of sand delivered under the contract dated May 5, 1909, with the Kentucky and Ohio Transportation Company:

Classification.	Quantity.	Unit price.	Amount.
Sand:	*Yards.*		
Delivered at Frankfort, Ky	733	$0.98	$718.34
Delivered at Carrollton, Ky	468.4	.98	459.03

The following is a statement of steel lower lock gates received under the contract dated May 6, 1909, with the Penn Bridge Company:

Classification.	Quantity.	Unit price.	Amount.
	Pounds.		
Steel lower lock gates	74,729	$0.0511	$3,818.65

The following is a statement of lumber received under the contract dated May 6, 1909, with the Capital Lumber and Manufacturing Company:

Classification.	Quantity.	Unit price.	Amount.
	Feet.		
Long-leaf yellow pine	344,162	$25.30	$8,707.30

The following is a statement of work done under contract dated April 1, 1909, with the M. A. Sweeney Shipyard and Foundry Company:

Classification.	Number.	Unit price.	Amount.
Towboat	1	$16,915	$16,915

List of leases in force during the fiscal year ending June 30, 1910, Kentucky River, Kentucky.

Location, Lock No. 4.
Lessee, Kentucky River Mills.
Date, July 10, 1878.
Expires, July 10, 1977.
Annual rental, $180 per year.
Location, Beattyville, Ky.
Lessee, Kate Reid.
Date, July 8, 1908.
Expires, July 1, 1913.
Annual rental, $10 per year.

Summary of expenditures for operating and care of locks and dams on Kentucky River, Kentucky, for fiscal year ending June 30, 1910.

Services (including administration, superintendence, and inspection)	$72, 796. 19
Materials (including contract work)	37, 807. 50
New plant	27, 753. 61
Fuel	5, 852. 69
Supplies	6, 615. 11
Subsistence supplies (crews of towboats)	2, 248. 10
Hire of plant	1, 387. 75
Miscellaneous expenses	1, 183. 25
Administration (main office)	4, 000. 00
Total	159, 644. 20

ALLOTMENTS.

July, 1884	$15, 000. 00
July, 1885	27, 615. 00
July 31, 1886	33, 965. 00
July, 1887	79, 862. 14
July, 1888	82, 478. 50
July 28, 1889	72, 394. 80
July 17, 1890	28, 889. 07
July 16, 1891	36, 331. 38
November 28, 1891	1, 112. 50
December 14, 1891	11, 382. 80
July 15, 1892	38, 503. 62
June 13, 1893	2, 000. 00
July 14, 1893	73, 065. 02
July 16, 1894	46, 435. 28
July 20, 1895	59, 120. 04
July 24, 1896	70, 198. 85
August 2, 1897	49, 272. 11
July 15, 1898	53, 531. 39
July 29, 1899	63, 884. 24
May 11, 1900	2, 500. 00
July 17, 1900	82, 284. 09
July 9, 1901	$109, 137. 49
August 19, 1901	952. 00
February 4, 1902	19, 000. 00
July 22, 1902	79, 634. 91
July 20, 1903	56, 971. 61
July 13, 1904	56, 953. 04
May 18, 1905	10, 000. 00
July 17, 1905	112, 480. 53
October 12, 1905	15, 867. 00
February 28, 1906	117, 305. 00
July 28, 1906	74, 816. 64
July 19, 1907	114, 626. 79
July 20, 1908	148, 904. 39
October 3, 1908	3, 800. 00
April 8, 1909	25, 285. 00
July 17, 1909	107, 807. 36
Total	1, 983, 367. 59
Received from sales, etc.	309. 99
Grand total	1, 983, 677. 58

CONTRACTS IN FORCE.

CONTRACT FOR CONSTRUCTING WOODEN-HULL TOWBOAT FOR USE ON THE KENTUCKY RIVER, KENTUCKY.

Name of contractor: M. A. Sweeney Shipyard and Foundry Company.
Date of contract: April 1, 1909.
Date of approval: May 4, 1909.
Date of beginning and date of expiration: Within twenty days after date of receipt by him of notification of approval of contract, and complete same on or before June 30, 1909.

Item.	Contract price.
Constructing wooden-hull towboat for use on the Kentucky River, Kentucky	$16,915

Completed.

CONTRACT FOR FURNISHING AND DELIVERING GRAVEL AT LOCKS NOS. 1 AND 4, KENTUCKY RIVER, KENTUCKY.

Name of contractor: The Kentucky and Ohio Transportation Company.
Date of contract: May 5, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: Delivery to be made when ordered; to remain in force until December 31, 1909, or until the full amount of gravel has been delivered.

Item.	Contract price.
For delivery at Lock No. 1, Kentucky River:	
1,300 cubic yards (approximately) of gravel .... cubic yard..	$1.23
For delivery at Lock No. 4, Kentucky River:	
1,500 cubic yards (approximately) of gravel .... do....	1.42

Completed.

CONTRACT FOR FURNISHING AND DELIVERING SAND AT LOCKS NOS. 1 AND 4, KENTUCKY RIVER, KENTUCKY.

Name of contractor: The Kentucky and Ohio Transportation Company.
Date of contract: May 5, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: Delivery to be made when ordered; to remain in force until December 31, 1909, or until the full amount of sand has been delivered.

Item.	Contract price.
For delivery at Lock No. 1, Kentucky River:	
500 cubic yards (approximately) of sand .... cubic yard..	$0.98
For delivery at Lock No. 4, Kentucky River:	
1,600 cubic yards (approximately) of sand .... do....	.96

Completed.

CONTRACT FOR FURNISHING AND DELIVERING LONGLEAF YELLOW PINE TIMBER FOR USE IN REPAIR WORK ON KENTUCKY RIVER, KENTUCKY.

Name of contractor: Capital Lumber and Manufacturing Company.
Date of contract: May 6, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: To commence immediately upon receipt of one number of the contract; to expire on or before June 12, 1909.

Item.	Contract price.
For 343,598 feet b. m. longleaf yellow pine, delivered at Frankfort, Ky...........M feet b. m..	$25.30

Completed.

CONTRACT FOR FURNISHING AND DELIVERING ABOUT 5,000 BARRELS AMERICAN PORTLAND CEMENT, FOR USE IN REPAIR WORK ON KENTUCKY RIVER, KENTUCKY.

Name of contractor: Kosmos Portland Cement Company (Incorporated).
Date of contract: May 6, 1909.
Date of approval: (Emergency).
Date of beginning and date of expiration: To begin when ordered; expires when full amount of cement called for has been delivered and accepted.

Item.	Contract price.
For furnishing, and delivering at Frankfort, Ky., about 5,000 barrels American Portland cement..per barrel..	$1.56
Rebate on empty bags returned to point of delivery....................................each..	.10

Completed.

CONTRACT FOR CONSTRUCTING STEEL LOCK GATES FOR LOCK NO. 1, KENTUCKY RIVER, KENTUCKY.

Name of contractor: Penn Bridge Company.
Date of contract: May 6, 1909.
Date of approval: (Emergency contract).
Date of beginning and date of expiration: Shall be commenced and completed on or before August 1, 1909.

Item.	Contract price.
For constructing steel lower lock gates for Lock No. 1, Kentucky River...........per pound..	0.05\frac{11}{100}$

Completed.

LEASE OF BARGE FOR USE IN TRANSPORTING MATERIALS FOR REPAIR WORK ON KENTUCKY RIVER, KENTUCKY.

Lessor: Kenney Brothers Company.
Date of lease: August 9, 1909.
Maximum time: 120 days.

Item.	Contract price.
Hire of 1 decked barge..per day..	$3.00

Completed.

CONTRACT FOR HIRE OF TOWBOAT FOR USE IN REPAIR WORK ON KENTUCKY RIVER, KENTUCKY.

Name of contractor: Lewis Tanner.
Date of contract: August 2, 1909.
Date of approval: (Emergency.)
Date of beginning and date of expiration: To begin when ordered; to terminate at the discretion of the United States. (Probable time of employment, sixty days.)

Item.	Contract price.
For hire of towboat and crew ... per day..	$19.50

Completed.

CONTRACT FOR FURNISHING AND DELIVERING GRAVEL AT LOCK NO. 4, KENTUCKY RIVER, KENTUCKY.

Name of contractor: The Kentucky and Ohio Transportation Company.
Date of contract: October 7, 1909.
Date of approval: (Emergency.)
Date of beginning and date of expiration: To begin when ordered; to terminate February 1, 1910.

Item.	Contract price.
1,500 cubic yards (approximately) gravel ... cubic yard..	$1.42

Completed.

CONTRACT FOR FURNISHING AMERICAN PORTLAND CEMENT, DELIVERED F. O. B. FRANKFORT, KY., FOR REPAIR WORK ON KENTUCKY RIVER.

Name of contractor: Kosmos Portland Cement Company.
Date of contract: October 7, 1909.
Date of approval: (Emergency.)
Date of beginning and date of expiration: To begin when ordered; to expire when full amount of cement has been delivered.

Item.	Contract price.
About 1,000 barrels American Portland cement, delivered at Frankfort, Ky ... per barrel..	$1.56
Rebate allowed on empty bags returned to point of delivery ... per bag..	.10

Completed.

CONTRACT FOR CONSTRUCTING AND DELIVERING AT LOCK NO. 1, KENTUCKY RIVER, ONE WOODEN BARGE.

Item.	Contract price.
For constructing 1 wooden barge (red Oregon fir timber) and delivering same at Lock No. 1, Kentucky River ...	$2,200

Completed.

COMMERCIAL STATISTICS, 1910.

Season of navigation.—Opened July 1, 1909; closed June 30, 1910.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Steamers	22	22	1,909	....
Rafts	1,514	1,514	132,724	....
Total	1,536	1,536	134,633	9,322

Freight traffic.

Article.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	
Coal...bushels	1,888,340	71,800	$188,834.00	65	$0.0040
Oil...barrels	520	156	7,800.00	65	.0146
Iron and steel...pounds	518,000	259	12,890.00	65	.0307
Sand and gravel...cubic yards	29,645	40,255	37,056.25	65	.0034
Cement...barrels	10,976	2,195	15,366.40	220	.0039
Lumber...feet b. m.	826,510	1,634	20,662.50	65	.0153
Timber...cubic feet	5,530,180	132,724	483,890.75	155	.0015
Ties...number	25,555	2,555	11,499.75	220	.0036
Shingles...do	204,100	24	663.33	65	.0461
Grain...bushels	70,368	1,981	68,341.20	65	.0265
Hay...bales	1,077	134	2,680.00	65	.0230
Live stock...head	2,319	399	57,975.00	65	.0615
Salt...barrels	2,925	512	2,340.00	65	.0087
Sugar...do	1,457	233	30,597.00	65	.0307
Whisky...do	2,469	619	185,175.00	65	.0215
Flour...do	15,484	1,509	100,646.00	65	.0307
Tobacco...hogsheads	1,802	1,354	324,360.00	65	.0204
Produce...pounds	142,000	71	14,200.00	65	.0307
Miscellaneous...tons	5,371	5,371	537,100.00	65	.0307
Total	....	263,785	2,097,077.18	....	....

List of boats plying Kentucky River, Kentucky, during fiscal year ending June 30, 1910.

Name of boat.	Character.	Length.	Breadth.	Depth.	Tonnage.
		Feet.	*Feet.*	*Feet.*	
Kentucky	U. S. snag boat	148.00	34.0	5.6	244.00
Gregory	U. S. towboat	131.00	24.8	4.0	163.00
Pearl	U. S. launch	40.00	7.6	4.0	5.00
Park City	Packet	127.30	28.0	4.8	197.00
Oriole	do	121.00	22.5	3.5	75.00
Lena May	do	110.00	36.5	3.5	86.00
Nellie	do	110.00	24.0	3.1	85.00
Madison	do	86.00	16.0	4.0	48.00
Monie Bauer	do	73.00	17.6	3.0	45.00
Hanover	do	66.00	14.0	3.0	36.00
White Dove	do	65.00	14.0	3.0	35.00
Major Slack	Towboat	143.00	26.1	4.5	93.00
S. P. Gillett	do	134.00	28.0	4.5	96.00
Geo. Matheson No. 2	do	130.00	25.0	4.0	121.00
Nellie Willett	do	122.50	28.0	4.0	98.00
E. T. Slider	do	110.00	24.0	3.5	92.00
Reba Reeves	do	107.00	22.0	3.4	63.00
R. J. Armstrong	do	104.00	22.0	3.5	154.00
Antoinette	do	100.00	20.0	3.5	54.00

List of boats plying Kentucky River, Kentucky, etc.—Continued.

Name of boat.	Character.	Length.	Breadth.	Depth.	Tonnage.
		Feet.	*Feet.*	*Feet.*	
J. C. Burdett	Towboat	90.00	18.0	3.0	82.00
W. J. Roberts	do	75.00	16.0	3.5	38.00
Alys Gray	do	73.00	12.8	3.0	32.00
Gazette	do	69.00	15.8	1.6	10.00
Nettie Grant	do	69.00	12.0	3.0	20.00
Two States	do	63.00	16.0	3.0	11.00
Bertha M	do	62.80	10.4	2.0	10.00
Blue Wing	do	62.00	11.0	1.5	40.00
John A	do	61.80	11.0	3.0	13.00
Marguerite	do	59.00	10.0	2.0	13.00
Star	do	56.00	12.0	3.0	13.00
Circle A	do	55.60	10.0	2.0	13.00
Lucile	do	55.00	12.0	2.0	14.00
Georgie	do	55.00	11.0	2.4	15.00
Fannie	do	55.00	11.0	2.4	10.00
Loring	do	53.00	8.0	2.0	6.00
White Oak	do	52.00	12.0	2.5	8.50
Carolyn	do	50.00	12.0	2.5	12.00
Sandy	do	50.00	12.0	.7	5.00
Willie B	do	50.00	10.0	2.5	10.00
Elisha Woods	do	47.00	8.0	1.5	18.00
Basil	do	45.00	9.0	1.5	7.00
Polly	do	45.00	8.0	2.0	4.00
Walton	do	40.00	8.0	2.0	7.00
Mable	do	40.00	8.0	1.8	9.00
Nellie M	do	40.00	7.5	2.0	9.00
Dig	do	33.90	9.5	3.5	5.00
Harry H	do	32.00	8.0	2.0	8.00
Tecumseh	Pleasure boat	80.50	18.0	3.5	36.00
Charter No. 2	do	64.00	19.0	3.0	13.00
Monita	do	57.00	11.5	3.5	12.00
Estell	do	56.00	12.0	2.0	9.50
Alice	do	56.00	12.0	2.0	7.00
Shamrock	do	56.00	10.0	3.0	9.00
Adora	do	56.00	8.0	2.5	3.00
Mattie	do	56.00	8.0	2.5	3.00
Ollie S	do	54.00	11.8	3.0	34.00
Daisy M	do	51.00	11.4	3.0	8.00
Ellene	do	50.00	12.0	3.5	9.00
Clarion	do	45.00	10.0	3.5	12.00
Oak	do	45.00	10.0	3.0	12.00
Outing	do	40.00	9.5	2.5	9.00
Relsom	do	40.00	9.0	2.5	9.00
Shadow	do	40.00	8.6	4.0	2.00
Mable	do	40.00	8.0	1.8	9.00
Dixie	do	40.00	5.5	4.0	5.00
The Scout	do	39.00	7.6	2.5	4.00
Marjorie	do	38.00	7.9	5.0	3.00
Thelma G	do	38.00	7.0	2.5	5.00
Mona	do	31.00	8.6	4.6	4.00
Iris	do	37.00	8.2	4.5	5.00
Rescue	do	35.00	8.0	4.0	3.00
Clelette	do	35.00	8.0	4.0	3.00
Pomona	do	35.00	8.0	4.0	3.00
Gera L	do	35.00	7.6	6.0	4.00
Vevay	do	35.00	7.0	4.0	3.00
Raymond	do	35.00	7.0	4.0	3.00
Francis	do	33.00	7.0	4.6	2.50
Ina	do	33.00	7.0	4.2	4.00
Dora	do	33.00	4.4	2.6	1.50
Charley Kenney	do	32.00	8.0	4.6	4.00
Helen S	do	32.00	7.0	2.5	3.00
Eufaula	do	32.00	7.0	2.0	8.00
Nereid	do	32.00	6.5	3.0	4.00
Cincinnatus	do	32.00	5.8	3.6	2.00
Cruso	do	31.00	7.0	3.0	4.00
Amy	do	31.00	6.0	3.5	2.00
Gray	do	30.00	8.0	2.0	3.00
Alamo	do	30.00	7.0	4.0	3.00
Katherine L	do	30.00	7.0	3.5	5.00
Noweta	do	30.00	7.0	3.0	2.00
Aida	do	30.00	6.0	3.0	3.00
Ruth	do	30.00	6.0	3.0	2.50
Ramona	do	30.00	6.0	3.0	2.00
Marie	do	30.00	6.0	3.0	1.00
Go Sloe	do	30.00	4.5	3.5	1.50
Mud Lark	do	28.00	6.3	3.0	2.00
Jack	do	28.00	5.8	3.0	1.50
Ellen T	do	27.00	6.0	3.0	1.00

List of boats plying Kentucky River, Kentucky, etc.—Continued.

Name of boat.	Character.	Length.	Breadth.	Depth.	Tonnage.
		Feet.	*Feet.*	*Feet.*	
Viking	Pleasure boat	26.00	6.0	3.0	1.00
Virginia	do	26.00	5.0	3.0	1.50
Memory	do	26.00	5.0	3.0	1.50
Kelvin	do	25.00	6.2	2.4	2.00
Just Right	do	25.00	6.0	4.0	1.00
Aurora	do	25.00	6.0	3.0	2.00
St. Henry	do	25.00	6.0	2.5	3.00
Old Cro'	do	25.00	5.6	4.4	2.00
Nip	do	25.00	3.1	3.6	1.00
Shamrock	do	24.00	5.0	3.0	1.00
Leavenworth	do	24.00	5.0	3.0	1.00
Aurora	do	24.00	5.0	3.0	1.00
Owl	do	24.00	5.0	2.0	2.00
Louise H	do	23.00	6.0	4.5	2.00
Princess	do	22.50	5.0	3.0	1.50
Old Ironsides	do	22.00	6.0	2.5	2.00
G. McKay	do	22.00	5.4	2.1	2.00
Mud Hen	do	22.00	5.3	2.5	1.00
Margaret H	do	22.00	5.0	3.0	2.00
Wilma	do	22.00	5.0	2.0	1.00
Edith	do	22.00	5.0	1.5	2.00
Gray	do	22.00	4.8	3.5	1.50
Sir Huon	do	22.00	4.8	3.5	1.00
Alto	do	22.00	4.8	3.0	2.00
Rescue	do	22.00	4.6	2.0	1.00
Mable	do	22.00	4.5	2.5	1.00
Frazzle	do	22.00	4.0	3.0	1.00
Judge	do	22.00	4.0	2.0	1.00
Helen W	do	21.90	5.3	3.5	2.00
Caroline	do	21.50	5.0	2.5	1.50
Raymond	do	21.00	4.8	2.5	1.50
Slim Jim	do	21.00	4.5	2.5	1.00
Skip	do	21.00	4.0	2.0	1.00
J. B. Swift	do	21.00	4.0	2.0	1.00
Togo	do	21.00	4.0	1.3	1.00
Vega	do	20.00	5.3	3.0	1.50
Arthur S	do	20.00	5.1	2.3	1.00
Valkyrie	do	20.00	5.0	4.0	1.50
Nellie B	do	20.00	5.0	2.5	1.50
Madeline F	do	20.00	5.0	2.0	1.00
Hal-Els-Blan	do	20.00	4.5	3.0	1.50
Queen	do	19.00	5.0	1.1	1.00
C. R. Mason	do	19.00	4.6	3.0	1.50
Gera L	do	19.00	4.0	2.4	1.00
Teddy R	do	18.00	8.0	3.0	1.00
Peggy	do	18.00	5.0	2.5	2.00
Golbric'	do	18.00	5.0	2.5	1.50
Henrietta	do	18.00	5.0	2.5	1.00
Louise	do	18.00	4.6	3.0	1.00
Luella	do	18.00	4.6	1.9	1.50
Alice	do	18.00	4.6	1.1	1.00
Mary B	do	18.00	4.0	2.0	1.00
Dora	do	18.00	4.0	1.1	1.00
Mallard	do	18.00	3.0	2.5	1.00
Spray	do	16.00	4.2	2.0	1.00
Carrie Mack	do	16.00	4.0	2.0	1.00
Fanola	do				
Jessie	do				
Floradora	do				
Nellie Gray	do				
L. M. A	do				
Martha A	do				
Fred Sanders	do				
Bess	do				
Murat	do				
Doris	do				
Georgie No. 2	do				
Gray Goose	do				
Ellita	do				
Levering	do				
Polar Bear	do				
Alice	do				
Geneva	do				
Arbuckle	do				
Mildre	do				
Winston	do				
Ione	do				
Sea Fox	do				
Little Mack	do				

List of boats plying Kentucky River, Kentucky, etc.—Continued.

Name of boat.	Character.	Length.	Breadth.	Depth.	Tonnage.
		Feet.	*Feet.*	*Feet.*	
Daisy	Pleasure boat				
Wilfred	do				
Sue	do				
Emma	do				
Mary Ellen	do				
Ferro	do				
Clara B	do				
Buck	do				
Marion	do				
Little Jim	do				
Vega	do				
Saucy Sally	do				
Lizzie	do				
Mayflower	do				
Minnie D	do				
Lillie C	do				
Noble	do				
Belle	do				
Robert	do				
Gertrude	do				
Charlie Boy	do				
Spluey	do				
Edith	do				
Mary H	do				
Major Beahr	do				
Old Jim	do				
Bertha M	do				
Ready Boy	do				
Ellen T	do				
Skidoo	do				
Mollie	do				
Emma T	do				
John L	do				
Nora Lee	do				
Red Devil	do				
Wickliff	do				
Leo	do				
Hazel L	do				
Maple Leaf	do				
Pocahontas No. 3	do				
Jas. A. Doyle	do				
Uncle Jim	do				
Wellington	do				
Essawan	do				
Sprite	do				
Alma	do				
Blue Goose	do				

NOTE.—Where no dimensions are given the boats are small gasoline launches.

GG 7.

IMPROVEMENT OF GUYANDOT RIVER, WEST VIRGINIA.

For general description, project, etc., see Annual Report of the Chief of Engineers for 1901, pages 489, 490.

No work has been done on this river since 1899. The nature of the improvement has been open-river regulation, clearing the channel of obstructions, and removing overhanging trees from its bank.

It is proposed to expend the $5,000 appropriated in the river and harbor act approved June 25, 1910, in continuing the improvement in accordance with the adopted project, and to expend so much of the amount as may be necessary, not to exceed $2,000, for bank revetment.

No reliable record of the commerce of this river has been retained. It consists almost entirely of timber floated to market as loose logs or in rafts and would probably approximate 160,000 tons per year.

The stream is considered unworthy of improvement, owing to the absolute absence of any commerce on the river except as stated above.

APPROPRIATIONS.

June 18, 1878	$2,000.00	August 18, 1894	$2,000.00
March 3, 1879	1,000.00	June 3, 1896	1,000.00
June 14, 1880	2,000.00	March 3, 1899	1,000.00
March 3, 1881	3,500.00	June 25, 1910	5,000.00
August 2, 1882	2,000.00	Received from other sources in previous years	189.90
July 5, 1884	2,000.00		
August 11, 1888	2,000.00	Total	27,689.90
September 19, 1890	2,000.00		
July 13, 1892	2,000.00		

APPENDIX H H.

IMPROVEMENT OF RIVERS AND HARBORS IN THE LOUISVILLE, KENTUCKY, DISTRICT.

REPORT OF CAPT. LYTLE BROWN, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. **Falls of Ohio River at Louisville, Kentucky.**
2. **Operating and care of Louisville and Portland Canal, Kentucky.**
3. **Operating and care of lock and dam at Grand Rapids, Wabash River.**
4. **Green River above the mouth of Big Barren River, Kentucky.**
5. **Operating and care of locks and dams on Green and Barren rivers, Kentucky.**
6. **Operating and care of lock and dam on Rough River, Kentucky.**

United States Engineer Office,
Louisville, Ky., July 16, 1910.

Sir: I have the honor to transmit herewith annual reports of the works under my charge at the close of the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

Lytle Brown,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

H H 1.

IMPROVEMENT OF FALLS OF OHIO RIVER AT LOUISVILLE, KENTUCKY.

A condensed description of the original condition, outline of projects, etc., will be found on page 719 of this report; references to other reports, etc., will be found on page 488, Annual Report of the Chief of Engineers for 1904.

Following is a general description of the operations during the fiscal year:

BOULÉ DAM, SECTIONS NOS. 6, 7, 8, AND 9.

At the close of the fiscal year 1909 there remained to be done the following piers and sections for completing the dam at the head of Falls of Ohio River:

Pier No. 5, concrete, 16 feet 3 inches wide, partly constructed in 1908; 68.1 cubic yards concrete remained to be placed on east end of pier.
Section No. 6, Boulé dam, 188 feet long.
Pier No. 6, concrete, 15.96 feet wide.
Section No. 6A, Boulé dam, 196 feet long.
Pier No. 6A, concrete, 16 feet 3 inches wide.
Section No. 7, Boulé dam, 196 feet long.
Section No. 8, Boulé dam, 152 feet long.

Work was resumed on July 20 and continued through the season.

From July 22 to 27 built and set cribs for temporary dam in front of sections Nos. 7 and 8; commenced sheathing cribs July 27, completing the same on the 29th. Stone used for weighting down cribs was loaded on barges at concrete dam section No. 11 and at north canal wall station No. 89 and towed to cribs.

Holes 20 inches deep were drilled behind cribs, and pins placed in same for holding cribs in place. From August 1 to 9 and 17 to 23 work was practically suspended on account of a rising river. During the remainder of August cofferdams were made, boiler and engine set up for pump, telephone line rebuilt, and on August 10 began pumping water from cofferdam.

On August 13 connected 99 feet of 5-inch and 66 feet of 2½-inch pipe from drill boats to steam drills, and commenced drilling for foundation, continuing to August 16, inclusive.

About 75 feet of cofferdam in front of section 8 was washed out by high water; this was rebuilt August 24 and pumps again started. Drilling and blasting was resumed on August 25 and continued to August 31, when all of the disrupted rock was removed from foundation. On August 28 began setting sills and drilling for hold-down bolts and braces, section No. 8; the drilling was completed September 1. On September 2 began concreting sills, and completed same September 7. September 8 and 9 transferred trestles from canal wall and placed them in position, thus completing section No. 8.

September 8 began blasting for foundation of section No. 7; September 20 commenced drilling for hold-down bolts for sills. Steel trestles were transferred from canal bank, and all were set in place by October 3.

SECTIONS NOS. 6 AND 6A.

Section No. 6.—Temporary dam was built during September. Began blasting for foundation October 11, setting sills October 22, and completed same October 25. Trestles were all set in place by October 28.

Section No. 6A.—Completed blasting rock for foundation October 8, drilling and setting sills October 13, concreting sills October 15, and setting up trestles October 18.

Pier No. 4.—October 29 began building dam for enlarging pier No. 4, extending it up the river 30 feet and 6 feet in width, in order to place signal tower on it. Concrete forms for pier were completed November 8 and concreting commenced; the pier was completed November 11. Built form for signal tower on pier No. 4 and commenced concreting November 13, and completed same November 17. The tower was reenforced with 8 steel rails 26 feet long.

Following is a summary of work done on pier No. 4:

Cribbing placed around pier	linear feet	240
Sheathing placed on cribs	do	432
Rock placed in cribs	cubic yards	30
Earth placed in temporary dam	do	110
Forms placed for pier	linear feet	93.3
Concrete placed in pier	cubic yards	176.66
Concrete placed in signal tower on pier No. 4	do	42.99

The canal-shop forces made repairs to drill boats, skiffs, and barges, as required; completed gasoline launch on July 30; made side rods for steam drills; hauled sawdust and manure from stable to lock-basin wall, where it was loaded on barges and towed to works for stopping leaks in temporary dam. Set up telephone poles from Fourteenth street to site of work; repaired wheel and furnace on steamer *Wave Rock;* made loading sticks and plugs for drillers' use; made tie chains for operating dam; repaired old docked hull of steamer *Shawnee;* made new wheel for steamer *Emerald;* and repaired buoy at Wave Rock dike; dismantled two compressor scows; transferred machinery to power house, where it was cleaned and stored; removed loose rock and gravel from foundation of section No. 5; placed five anchor bolts, with wooden buoys attached, in ledge at bottom of river east of new dam; placed ring bolts in pier No. 5, and made and put up iron ladders on signal towers.

The following is a summary of work accomplished:

Cribbing built and placed	linear feet		1,070
Temporary dam covered with sheathing	do		790
Stone placed in cribs	cubic yards		127.2
Holes, 20 inches deep, drilled behind cribbing and iron pins placed in same	number		32
Sand sacked and placed in cofferdam	cubic yards		388.43
Earth used in temporary dam	do		489.2
Trestles placed in dam	number		209
Drills operated	do		2 to 13
Holes drilled	do		5,124
Holes drilled	linear feet		13,318.33
Blasts made	number		277
Holes fired	do		2,262
Holes fired	linear feet		6,335.5
Dynamite used:			
75 per cent	pounds	1,156.5	
60 per cent	do	435	
			1,591.5
Exploders used:			
6-foot	number	770	
8-foot	do	1,302	
12-foot	do	279	
			2,351
Rock disrupted and removed	cubic yards		823.4
Upstream sills set in place	linear feet		738
Downstream sills set in place	do		738
Manure used in stopping leaks	cubic yards		75
Concrete placed in:			
Pier No. 5	do		74.9
Tower on pier No. 4	do		40
Sills section No. 6A	do		88.5
Foundation section No. 6A	do		103.5
Pier No. 6	do		265.5
Pier No. 6A	do		228.1
Section No. 6	do		98
Foundation section No. 6	do		115.83

Concrete placed in—Continued.			
Foundation section No. 7	cubic yards		100.95
Sills section No. 7	do		85.40
Sills section No. 8	do		80.7
Foundation section No. 8	do		91.2
Anchor cribs blown up with dynamite:			
Blasts	number		4
Exploders used, 8 feet long	do		38
Dynamite used:			
60 per cent	pounds	80	
75 per cent	do	80	
			160
Rock taken from east of former cross dam and from north canal wall and placed in pier No. 9	cubic yards		650

Expended, sections Nos. 6, 7, 8, and 9.

	To June 30, 1909.	To June 30, 1910.	Total
FOUNDATION.			
Labor:			
Drilling and blasting for anchor bolts	$223.27	$2,531.23	$2,754.50
Repairs to drills	490.11	568.68	1,058.79
Handling and unloading cement	151.02	66.84	217.86
Connecting and removing pipes	188.23	....	188.23
Testing cement	39.82	....	39.82
Placing pumps, operating pump and cable way	1,220.15	1,995.78	3,215.93
Removing disrupted rock	87.02	1,991.58	2,078.60
Removing old dam	54.28	....	54.28
Making hold-down bolts	21.15	....	21.15
Cutting pipe, etc	13.54	159.01	172.55
Total labor	2,488.59	7,313.12	9,801.71
Material:			
Drill parts, pipe, hose, etc	1,251.92	576.56	1,828.48
Forks, shovels, steel, etc	80.94	....	80.94
Exploders and dynamite	216.75	304.50	521.25
Rope, buckets, and mule hire	170.87	....	170.87
Cement	1,304.00	....	1,304.00
Sand and gravel	707.06	105.60	812.66
Repairs parts Kitson lamps	163.83	....	163.83
Lead wire	28.96	....	28.96
Total material	3,924.33	986.66	4,910.99
SILLS.			
Labor:			
Blacksmith and machinist work	292.92	96.80	389.72
Blacksmith and machinist work on angle-iron bolts	15.35	....	15.35
Dressing, framing, storing, and placing	80.81	685.12	765.93
Concreting, making forms, and removing	272.21	2,437.96	2,710.17
Excavating for sills	....	76.88	76.88
Drilling for hold-down bolts	118.37	473.00	591.37
Total labor	779.66	3,769.76	4,549.42
Material:			
Lumber for sills and forms	688.01	113.46	801.47
Iron for bolts	627.79	....	627.79
Platforms for concrete	44.94	....	44.94
Angle irons	466.62	....	466.62
Sand and gravel	....	310.73	310.73
Total material	1,827.36	424.19	2,251.55
TEMPORARY DAM.			
Labor:			
Framing and handling material	2,958.83	492.78	3,451.61
Breaking rock for cribs	645.96	....	645.96
Making drift bolts	8.64	....	8.64
Anchor bolts for boats	202.80	....	202.80
Building and repairing dam	2,505.94	5,672.50	8,178.44
Removing dam and storing lumber	439,15	509.15	948.30
Steamers Wave Rock and Willow Point	2,233.90	....	2,233.90
Steamers Wave Rock and Emerald	....	2,419.64	2,419.64
Miscellaneous, watching, etc	134.49	4.13	138.62
Removing cofferdam	30.51	....	30.51
Repairing cofferdam	737.36	....	737.36
Repairing Blake pump	24.65	6.03	30.68
Total labor	9,922.23	9,104.23	19,026.46

Expended, sections Nos. 6, 7, 8, and 9—Continued.

	To June 30, 1909.	To June 30, 1910.	Total.
TEMPORARY DAM—continued.			
Material:			
Lumber	$3,806.02	$1,671.36	$5,477.38
Sand	....	71.29	71.29
Drift bolts, spikes, nails, sacks, etc	673.75	857.68	1,531.43
Rope, boots, canvas, oil, and ice	2,287.37	....	2,287.37
Boiler tubes, Wave Rock and dredge Casey	109.02	....	109.02
Oars	44.25	....	44.25
Total material	6,920.41	2,600.33	9,520.74
PIERS.			
Labor:			
Making ring bolts for piers	31.90	60.06	91.96
Setting up mixer, etc	39.61	....	39.61
Building, placing, and removing forms	981.07	304.98	1,286.05
Drilling behind forms	150.54	....	150.54
Concreting	2,420.53	924.33	3,344.86
Locating and building towers	....	1,171.74	1,171.74
Making angle-iron bolts and setting angles	28.08	75.55	103.63
Filling stone in piers	25.20	206.39	231.59
Total labor	3,676.93	2,743.05	6,419.98
Material:			
Cement	1,005.10	19.50	1,024.60
Iron for ring bolts	11.97	....	11.97
Nails and lumber for forms	106.66	....	106.66
Lumber	205.03	244.00	449.03
4 I-beams	22.37	14.77	37.14
Sand and gravel	....	400.03	400.03
Total material	1,351.13	678.30	2,029.43
TRESTLES.			
Labor:			
Handling and placing	130.38	535.50	665.88
Inspecting and handling	365.28	....	365.28
Total labor	495.66	535.50	1,031.16
Material:			
231 trestles	17,474.00	....	17,474.00
474 deck-frame bolts	27.30	....	27.30
246 deck frames	1,187.53	....	1,187.53
Traveling expenses	17.78	....	17.78
Total material	18,706.61	....	18,706.61
TRESTLE BOXES.			
Labor:			
Handling, inspecting, and placing	33.10	6.95	40.05
Material:			
479 trestle boxes	1,751.19	....	1,751.19
1,125 hold-down bolts	465.89	....	465.89
1,134 washers	15.67	....	15.67
499 trestle-box pins	177.35	....	177.35
Total material	2,410.10	....	2,410.10
DERRICKS.			
Labor, framing	3.75	....	3.75
Material, lumber	165.32	....	165.32
WICKETS.			
Labor:			
Carpenter, blacksmith, and machinist work	892.66	....	892.66
Handling and placing	....	97.32	97.32
Making lock bars for wickets	....	44.30	44.30
Total labor	892.66	141.62	1,034.28
Material:			
Lumber	719.81	....	719.81
Angle-iron rivets, washers	369.20	....	369.20
Iron for handles	148.14	....	148.14
Total material	1,237.15	....	1,237.15

Expended, sections Nos. 6, 7, 8, and 9—Continued.

	To June 30, 1909.	To June 30, 1910.	Total.
RAILROAD.			
Labor:			
Framing timber for piers	$871.15	....	$871.15
Laying tracks	410.14	....	410.14
Loading coal on boats	27.20	....	27.20
Removing tracks, etc	59.13	....	59.13
Total labor	1,367.62	....	1,367.62
Material:			
Lumber	1,572.24	....	1,572.24
Spikes and nails	75.20	....	75.20
Wire rope	218.24	....	218.24
Total material	1,865.68	....	1,865.68
SKIFFS.			
Labor:			
Building	114.64	....	114.64
Material:			
Lumber, oars, nails, etc	159.61	....	159.61
TELEPHONE.			
Labor:			
Setting up and removing lines	183.69	$173.19	356.88
Material:			
Wire and insulators	19.37	4.24	23.61
MISCELLANEOUS.			
2 new barges	1,637.58	....	1,637.58
Watching, etc	901.46	718.53	1,619.99
Lowering and raising dams	286.58	343.52	630.10
Repairs to boats and plant	7,587.07	1,821.85	9,408.92
Telephone rent	164.25	24.00	188.25
Office force	2,024.91	1,356.64	3,381.55
Coal, miscellaneous supplies, etc	3,969.08	3,383.56	7,352.64
Surveying	568.15	627.54	1,195.69
Skiffmen	296.38	37.06	333.44
Tubing for operating wickets	12.96	....	12.96
Lock bars	262.64	....	262.64
Ram for use on wickets	54.47	....	54.47
New gasoline launch	295.74	281.70	577.44
Compensation to injured employees	....	483.12	483.12
Testing cement	....	8.36	8.36
Storing material	....	981.46	981.46
Making chains for dam	....	37.64	37.64
Ring bolts for buoys	....	113.95	113.95
Ladders for towers	....	25.17	25.17
Cement	....	1,813.30	1,813.30
Total	18,061.22	12,057.40	30,118.62
MISCELLANEOUS EXPENDITURES AFTER DAM WAS COMPLETED.			
Repairs to boats and plant	....	186.42	186.42
Making hooks, clevises, and fastening wickets together	....	374.32	374.32
Repairing wickets and trestles damaged by ice	....	100.33	100.33
Dam tenders	....	473.29	473.29
Miscellaneous supplies, telephone rent, etc	....	200.60	200.60
Two maneuvering boats	....	325.99	325.99
8 buoys	....	259.57	259.57
Dismantling drill scows and storing machinery	....	326.58	326.58
Total	....	2,247.05	2,247.05

Expended on sections 6, 6A, 7, 8, and 9, fiscal year 1910.

Labor	$31,829.56	
Material	8,708.98	
		$40,538.54
Expended prior to June 30, 1909		76,606.82
Total cost sections 6, 6A, 7, 8, and 9		117,145.36
Expended since dam was completed		2,247.05
Total expenditures to June 30, 1910		119,392.41

SECTION NO. 10, CHANOINE DAM.

The amount expended for this section was for the purchase of lumber and making needles for Chanoine dam.

Labor	$3.28
Material	83.53
Total	86.81

REMOVAL OF DISRUPTED ROCK.

Dredge *Louisville* worked one crew from November 8 to 30; two crews May 12, 13, and 14; and one crew on June 10, dredging disrupted rock, removing 2,420 cubic yards, scow measure, or 1,210 cubic yards, place measure; also 675 cubic yards mud and gravel, scow measure.

Dredge *Casey* worked two crews from November 22 to December 19; May 7 to 14 and 20 to 27; June 1 to 10; and one crew on June 11 and 24, dredging disrupted rock, removing 1,590 cubic yards, scow measure, or 795 cubic yards, place measure; also 2,615 cubic yards mud and gravel, scow measure.

On June 24 the work of removing disrupted rock was completed. Following is summary of work done:

Blasts made	number	11
Holes blasted in disrupted rock too large for dippers (linear feet 22), number		23
Exploders used, 20 6-foot and 4 8-foot	number	24
Dynamite used, 60 per cent	pounds	19½
Rock removed (place measure)	cubic yards	2,005
Mud and gravel removed (scow measure)	do	3,290

Expenditures were as follows:

Labor:		
Dredging	$2,572.37	
Blasting large rock	22.78	
Coaling boats	184.81	
Dragging for loose rock	66.37	
		$2,846.33
Material: Dynamite		48.00
Total expenditures		2,894.33

The description of operations, etc., in this report is taken from the report of Assistant Engineer John H. Casey, who has had local supervision of the work throughout the year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $500,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Enlargement at head of canal and of basin at lock:		
July 5, 1884	$300,000.00	
August 5, 1886	150,000.00	
August 11, 1888	150,000.00	
September 19, 1890	60,000.00	
July 13, 1892	60,000.00	
August 18, 1894	60,000.00	
		$780,000.00
Allotments for Indiana Chute from appropriations for improving Ohio River:		
July 14, 1880	$10,000.00	
March 3, 1881	50,000.00	
August 2, 1882	35,000.00	
July 5, 1884	10,000.00	
August 5, 1886	20,000.00	
August 11, 1888	15,000.00	
		140,000.00
Appropriations for work on Indiana Chute:		
September 19, 1890	$25,000.00	
July 13, 1892	35,000.00	
August 18, 1894	20,000.00	
		80,000.00
Net allotment from appropriation for maintenance of river and harbor improvements, act of April 28, 1904		14,545.06
Net allotment from appropriation for improving Ohio River, general improvement, act of March 3, 1905		5,353.80
Appropriations for improving Falls of Ohio River and Indiana Chute, Falls of Ohio River:		
June 3, 1896	$10,000.00	
June 4, 1897	350,000.00	
July 1, 1898	152,250.00	
March 3, 1899	15,000.00	
June 13, 1902	41,000.00	
March 3, 1905	80,000.00	
March 2, 1907	314,000.00	
		962,250.00
October 17, 1906, sale of property		350.00
Total		1,982,498.86

H H 2.

OPERATING AND CARE OF LOUISVILLE AND PORTLAND CANAL, KENTUCKY.

Description of original condition and references to former reports, documents, etc., will be found on page 491, Annual Report of the Chief of Engineers for 1904.

The project and estimate for the fiscal year ending June 30, 1910, approved July 14 and August 16, 1909, provided as follows:

> It is proposed to operate the canal and locks and to make such repairs as may from time to time become necessary to maintain them in good navigable condition; to operate the dredging outfit as needed in clearing the canal and locks of deposit brought into them by high water; to make such repairs to the towboats, dredges, buildings, walls, slopes, pavements, roadways, bridges, fences, and other government property as are necessary to maintain them in good serviceable condition; to repair guard gate abutments; and replace the old stable with a new one.

The estimate for the year is summarized as follows:

Regular force	$61,404
Repairs	13,550
New stable[a]	8,000
Miscellaneous supplies and contingencies	16,500
Total	99,454

Under the foregoing project and estimate, the operations during the fiscal year, in addition to the usual work of passing traffic, operating the movable dams, and ordinary current repairs incident to care and preservation, were as follows:

The canal was open to navigation three hundred and twenty-eight days and closed thirty-seven days on account of high water. There was no traffic through the canal on account of ice from December 22 to 28, inclusive, and January 1 to 10, inclusive.

The highest stage of water occurred January 18, the upper gauge reading 27.3 feet and the lower gauge 53.8 feet; the lowest stage occurred October 18, the upper gauge reading 2.4 feet and the lower gauge 3.8 feet. The dams at head of canal were raised and lowered as follows:

	Raised.	Lowered.
Section No. 2	January 31 to February 3	January 7 and 8.
	March 15 to 17	February 19 and 20.
	June 14 to 18	June 11 and 12.
Section No. 3	February 4 and 5	February 18.
Section No. 5	November 11 and 12	December 23 and 24.
	February 10 to 16, raised 136 feet	Lowered except about 80 feet at south end.
	March 23 to 26	December 27 and 31 tried to lower the 80 feet but could not on account foundation being filled with stone and ice.
		January 3 to 6 lowered 48 feet of the 80 feet, leaving 32 feet standing, which could not be lowered on account of ice.
		February 17 lowered about 50 feet.
Section No. 6	March 24 to 26	December 13 and 14.
Section No. 7	November 13	Do.
Section No. 8	December 1 and 2	December 7 and 8.
Section No. 9	November 17	
	December 1 and 2	Do.
Section No. 10	April 8 to 16, 616 feet	April 16, 296 feet.
	May 9 and 10, 24 feet	April 19, 320 feet.
	May 26, 26 feet	May 11, 24 feet.
	June 2 to 7, 348 feet	May 27, 26 feet.
		June 8, 348 feet.

The automatic gate was lowered 162¼ hours during the year. The lock force operated lock gates, cut grass from slopes, set up new iron fence around canal office, removed old telephone poles from east of Twenty-eighth Street Bridge, painted door and window frames and inside walls of lock engine houses. Grouted seams in coping of north and south piers at guard gates and parapets at both ends of Twenty-eighth Street Bridge; grouted and pointed seams in lock walls and steps.

TOWBOATS AND DREDGES.

Steamer Cherokee.—Towed scows for dredges in canal, and barges, etc., for work at head of canal, working two crews from January 29 to June 30. Was laid up on account of repairs forty-one days; on account of ice and high water eight days; on account of crew sand blasting and cleaning hull of dredge *Louisville* and repairs to dredges and caring for floating plant eleven days; and on account crew working on dams five days.

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[a] Only $5,000 of this item was allotted, to be applied toward building a part of the proposed stable, with a view of providing the remainder subsequently.

Steamer Wave Rock.—Worked from July 21 to December 19 towing barges, etc., for work at head of canal. Was laid up one day on account of repairs to furnace and wheel.

Steamer Emerald.—Worked from August 31 to December 19 towing barges, etc., for work at head of canal. On April 26 and 27 worked in place of steamer *Cherokee* towing scows for dredges.

Dredge Louisville.—Was engaged from July 1 to June 30 removing mud from canal, lock chambers, and below locks, and Byrne & Speed basin. From January 29 to June 30 worked two crews, and from July 1 to January 28 one crew. Quantity of mud removed from canal, lock chambers, and below locks 78,610 cubic yards; from Byrne & Speed basin during November and May, 3,400 cubic yards. Was laid up on account of repairs seventy-eight days; ice and high water, fifty-one days; raising dams, twelve days; and inspecting boilers, two days.

Dredge Wabash.—Worked in canal between stations 3 and 119 from August 25 to September 2, September 8 to 20, and September 30 to October 18 removing 12,620 cubic yards mud, scow measure. From September 21 to 29 dredged in front of city wharf between Fifth and Sixth streets removing 3,950 cubic yards mud, scow measure. The expense of this latter dredging was borne by the city of Louisville and paid for in March, 1910. The balance of the time the dredge was out of commission and laid up in lock basin.

Dredge Casey.—From July 21 to November 30 was employed at head of canal working on the new dam. From July 1 to 21, December 20, and January 22 to June 30 worked two crews in canal in lock chambers and below locks removing 91,525 cubic yards mud and 5 cubic yards rock, scow measure, 2,595 cubic yards of which was removed from in front of city wharf log. On May 3 and 4 dredged in Byrne & Speed basin removing 1,150 cubic yards mud, scow measure, the expense of which was borne by the Byrne & Speed Coal Company. Was laid up on account of repairs nine days; ice and high water, thirty-six days; testing boiler, two days; and raising sunken scow, two days.

Expenditures, regular force	$38,857.70

REPAIRS.

Steamer Cherokee.—Was placed on dry dock November 17, and remained there to December 14, during which time the following repairs were made:

Repaired planking, old floor timbers, machinery, cylinder packing, fantail, steam drum, breeching, rudder irons, and capstan engine. Replaced sides, knuckles, and stem, and put on new nosing around head and for 50 feet aft on each side; rebuilt furnace, reset capstan bed, replaced sheet iron on hull and painted hull to water line. Made new stacks for auxiliary boiler.

Steamer Wave Rock.—Repaired furnace, injectors, capstan bars, joints on steam pipes, throttle valve, stack knees, and made new swinging fenders.

Steamer Emerald.—Repaired roof.

Dredge Louisville.—Was placed on dry dock August 24, remaining on to October 9, while the following repairs were being made:

Forward spud casing on starboard side near water line was repaired by putting in new plates and angles; patches from 1 to 10 feet square were placed on the four corners of hull below water line; and all loose and worn-out rivets, mostly in the knuckle, were removed and new ones put in. All worn or defective parts of main engine were either replaced or repaired; the cylinders were bored out and new piston heads, rods, and packing made; a new main shaft (cast steel) was turned, and drivers, eccentrics, etc., fitted to same; engine frame repaired where cracked, and new pillow blocks put in place. New cast-steel pinions and sprocket wheels were purchased for main driver, spuds, endless chain, etc., and turned, bored, and keyseated. The inside of hull was cleaned and painted, and the inside and outside of cabin painted. Minor repairs were made from time to time during the year as required.

Dredge Casey.—The following repairs were made during the year:

Made and erected new steel mast; repaired capstan engine and boiler, cross-head brasses on engines, and fitted up sheaves for wire line. Repaired pitman brasses for capstan engine and journal box for drum shaft; made fenders for spud housings; calked steam dome on boiler; repaired hoisting engine; made new spuds; and painted inside and outside of cabin.

Dredge Wabash.—Repaired spud friction, dipper handle and dipper, and dressed and framed new spud. June 4 was placed on dry dock and her hull repaired and calked.

Canal, shops, etc.—Repairs were made as required to scows *Nos. 6, 7, 8, 11, 12, 13,* and *14;* patched deck and painted old hull of *Shawnee;* rebuilt chimneys on office and residence; repaired floors in machine shop and sawmill, jacks on Eighteenth Street Bridge; replaced worn-out wicket in middle gate of locks with new one; repaired and calked pump boat; painted roofs of residence and office; also painted Twenty-eighth Street Bridge, and commenced work of cleaning Eighteenth Street Bridge preparatory to painting.

New blocks were made to replace old ones in dry dock; at Eighteenth Street Bridge re-covered roof of stable and cottage, put new floor in kitchen, repaired back porch with new supports and floor.

Repaired and painted surrey; docked derrick boat and patched bottom. Repaired trestle and derrick at coal bin by replacing old timbers with new ones; repaired boiler furnace in machine shop and furnace in brass foundry; and made repairs to fences, buildings, etc., as required.

Expended:	
Labor	$8,618.51
Material	3,288.78
Total	11,907.29

EXTRA LABOR.

Installed new lathe in machine shop and removed old one; removed cabin and bulkheads from old hull of steamer *Shawnee;* installed boiler in mill engine room in place of one that was removed on account of leaking; cut grass and weeds from slopes between Ninth and Twenty-eighth streets; trimmed hedge; cleaned out dry dock, framing shed, and shipyard from time to time. Recharged fire extinguishers; made trestles and drawing boards for district engineer office; cleaned and washed walls and revetments after each high water; whitewashed inside walls of blacksmith shop; cleaned hulls of scows and barges; unloaded coal from four barges into coal bin; cleaned rock, etc., from foundation of Boulé dam; made two iron ladders and placed them on signal-light towers; converted condemned boiler into oil tank; watched and cared for floating plant, and coaled locks, shops, and boats.

Expended	$8, 718. 32

MISCELLANEOUS, SUPPLIES, ETC.

Expenditures under this heading were for necessary supplies for use in shops, on dredges and towboats, and for fuel for boats, locks, shops, etc., and amounted to $9,680.74.

DRY DOCK.

During the year the dry dock was used by 10 private boats fifty-four days and seventeen hours, for which $597.10 was collected.

It was used for docking 25 government boats one hundred and seventy days and nine hours.

ICE GORGE AT WOLF CREEK.

On January 18 property was transferred from canal locks to Tenth and Kentucky street depot, and 1 foreman and 48 laborers left for Stephensport, Ky., for the purpose of removing an ice gorge in the Ohio River at Wolf Creek. The gorge let go on the morning of the 18th, and the men proceeded to Henderson, Ky., as it was feared the gorge would again form at the bridge piers at that place, but as it passed safely the party returned January 19, 10.30 p. m., and the property was returned to the canal the next day.

WORK DONE FOR GREEN AND BARREN RIVERS.

New steamer Shawnee.—The hull of this boat was launched June 15, 1909, and practically completed, with the exception of transferring and setting up machinery from the old hull. This work was done and the boat completed during July. On July 28 a trial trip was made. Outfit and equipment were transferred from steamer *Emerald* to the new boat, and she left for Green River, 11.30 a. m., July 31, 1909.

Cost of new steamer *Shawnee:*

	Labor.	Material.	Total.
Expended during fiscal year 1909	$4, 530. 62	$2, 143. 69	$6. 674. 31
Expended during fiscal year 1910	1. 596. 31	190. 59	1, 786. 90
Total	6, 126. 93	2, 334. 28	8, 461. 21

New dump scows.—Two new dump scows, 70 feet by 21 feet by 5 feet 6½ inches, were built at the canal for use on Green River. February 16 began framing timbers for the two scows; March 22 commenced to assemble timbers for one scow; April 30 the first scow was launched, and completed May 2. The second scow was completed June 4. Steamer *Cherokee* left June 6, 9.15 a. m., in tow with the two new scows, for Lock No. 1, Green River; returned June 9, 5.15 p. m.

Cost of new scows:

Labor	$3,068.13
Material	3,680.46
Towing scows to Green River	117.41
	6,866.00

The canal shop forces fitted up valves and suckers for pumps, bored and keyseated steel pinion for use on Green River, and repaired steamer *Emerald.*

Labor, repairing steamer *Emerald*	$12.41
Labor, boring and keyseating pinion	3.12
Labor, work on barge pumps	6.00
Ice furnished *Shawnee*, trip to Green River	1.00
	22.53

OHIO RIVER SURVEY.

The amount expended for this work was for making drawing boards, trestles, and benches; repairing barge pumps; watching and caring for boats; dismantling drill boats and storing machinery and property in canal warehouse and old blacksmith shop at canal; repairing roof of building in which the property was stored; building platform in warehouse for storing property on; and for labor and supplies furnished steamer *Cherokee* in towing survey boats from Cincinnati, Ohio, to canal locks.

Expended.

	Labor.	Material, etc.	Total.
Storing property, etc	$323.67		$323.67
Repairing barge pump	1.56		1.56
Steamer Cherokee, trip to Cincinnati	130.68		130.68
Surveyor's time in engineer office	60.00		60.00
Work on drawing boards, trestles, etc	93.75		93.75
Watching and caring for fleet	371.29		371.29
Laundry work done for boats		$74.28	74.28
Lumber for drawing boards		99.73	99.73
Fuel and provisions steamer Cherokee		91.77	91.77
Roofing blacksmith shop		57.79	57.79
Total	980.95	323.57	1,304.52

The description of operations, etc., in this report is taken from the report of Assistant Engineer John H. Casey, who has had local supervision of the work throughout the year.

Summary of expenditures on account of operating and care of Louisville and Portland Canal, fiscal year 1910, showing general items and amount expended under each heading.

Item.	Amount.
Services	$60,567.60
Supplies	8,457.81
Materials	5,515.81
Miscellaneous	553.66
Total	75,094.88

Collections.

1909.		
Aug. 2.	O'Neil Coal and Coke Company, use of dry dock	$46.67
Sept. 4.	Kentucky and Indiana Bridge and Railroad Company, rent of land	250.00
Oct. 8.	Speed Elevator Company, rent of land	125.00
Oct. 27.	Kentucky River Transportation Company, use of dry dock	158.75
Nov. 3.	P. C. Donaldson, use of dry dock	27.50
Nov. 9.	Byrne & Speed Coal Company, use of dredging plant	120.00
Dec. 22.	O'Donnell & Co., rent of land	50.00
1910.		
Jan. 3.	Louisville Cement Company, rent of land	30.00
Jan. 5.	Nugent Sand Company, use of dry dock	135.00
Jan. 12.	L. Hammerschmidt, use of dry dock	45.42
Jan. 14.	Union Cement and Lime Company, rent of land	5.00
Feb. 7.	Kentucky and Indiana Bridge and Railroad Company, rent of land	10.00
Mar. 1.	E. T. Slider, use of dry dock	92.50
Mar. 19.	City of Louisville, Ky., use of dredging plant	270.00
Mar. 26.	Speed Elevator Company, rent of land	125.00
May 10.	Nugent Sand Company, use of dry dock	25.42
May 14.	Byrne & Speed Coal Company, use of dredging plant	97.50
May 19.	E. T. Slider, use of dry dock	37.92
June 1.	Monongahela River Consolidated Coal and Coke Company, use of dry dock	27.92
Total		1,679.60

All of the above collections were deposited to the credit of the Treasurer of the United States.

APPROPRIATIONS AND ALLOTMENTS.

APPROPRIATIONS.

Act of March 3, 1881	$40,562.91

ALLOTMENTS.

[From act of March 3, 1881.]

Fiscal year 1882	$54,105.66
Fiscal year 1883	61,333.14
Fiscal year 1884	53,189.18
Fiscal year 1885	4,872.02

[From act of July 5, 1884.]

———, 1884	67,496.56
August 3, 1885	91,840.00
July 28, 1886	82,820.00
July 2, 1887	77,805.00
July 13, 1888	$99,456.79
July 20, 1889	93,744.00
July 19, 1890	55,548.88
July 17, 1891	78,769.38
July 20, 1892	102,175.94
July 13, 1893	77,158.68
September 9, 1893	2,000.00
July 11, 1894	114,528.08
November 27, 1894	1,500.00
July 11, 1895	112,838.28
July 28, 1896	123,715.05
July 28, 1897	67,311.47

July 15, 1898	$62,061.71
July 19, 1899	78,422.89
July 18, 1900	78,590.05
July 17, 1901	108,550.20
July 30, 1902	118,732.34
July 24, 1903	43,484.66
July 15, 1904	92,385.46
July 20, 1905	76,748.41
September 9, 1905	25,000.00
March 10, 1906	10,200.00
July 13, 1906	108,567.53
July 18, 1907	102,645.79
July 15, 1908	91,222.68
July 14, 1909[a]	$75,042.56
August 16, 1909[a]	5,000.00
	2,538,945.30
[Transfer settlement.]	
July 29, 1909	14.31
[Collection.]	
May 19, 1910, for contract prints	1.00
Total	2,538,960.61

COMMERCIAL STATISTICS.

Statements of traffic and commerce through the Louisville and Portland Canal and through the open-river channel over the Falls of the Ohio River at Louisville, Ky., from July 1, 1909, to June 30, 1910.

TRAFFIC.

Kind of craft.	Canal.		Open-river channel.		Total.	
	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
Passenger boats	358	98,312	91	28,025	449	126,337
Towboats	948	87,241	335	47,492	1,283	134,733
Government boats	188	15,417	20	2,002	208	17,419
Coal barges	1,528	448,558	449	131,612	1,977	580,170
Other barges	806	135,232	168	50,972	974	186,204
Small craft	501	1,048	12	57	513	1,105
Total	4,329	785,808	1,075	260,160	5,404	1,045,968
Lockages, fiscal year		1,864				

COMMERCE.

Articles.	Canal.	Open-river channel.	Total.
	Tons.	*Tons.*	*Tons.*
Coal	593,293¾	289,429	884,722¾
Corn	1,174	91¼	1,265¼
Wheat	1,198½	48	2,037½
Salt	13,741	76½	13,817½
Oil	619	118½	737½
Whisky	994¾	154½	1,149¼
Flour	191½	13	204½
Sugar	248¾	83½	332¼
Molasses	1,033¼	620½	1,653¾
Cement	490½	128¼	618¾
Tobacco	1,647½	347½	1,995
Cotton	48½	17½	66
Hay	5,013	389½	5,402½
Straw	2,199½	244	2,443½
Cattle	737½	113½	851
Swine and sheep	1,485	153¼	1,638¼
Horses and mules	175¾	27¾	203½
Lumber	19,542½	8,213½	27,756
Staves and shingles	2,291¼	2¼	2,293½
Steel rails	75		75
Manufactured iron	11,081	5,716	16,797
Brick		4,683	4,683
Produce	1,976½	5¼	1,981¾
Miscellaneous	37,284	31,313	68,597
Total	699,333	341,990	1,041,323
Passengers……number	8,824	1,625	10,449

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[a] Act of March 3, 1909.

Comparative statement of traffic and commerce—Louisville, Ky.

TRAFFIC.

Fiscal year.	Louisville and Portland Canal.					Open river.					Aggregate.
	Passenger boats.	Tow-boats.	Coal boats and barges.	Miscellaneous.	Total.	Passenger boats.	Tow-boats.	Coal boats and barges.	Miscellaneous.	Total.	
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
1895	637	513	2,121	353	3,624	101	227	577	3	908	4,532
1896	635	771	2,975	184	4,565	128	274	641	2	1,045	5,610
1897	649	746	2,483	279	4,157	310	823	1,374	33	2,540	6,697
1898	595	883	2,847	265	4,590	175	435	838	67	1,515	6,105
1899	584	859	2,783	354	4,580	230	659	1,432	148	2,469	7,049
1900	681	988	3,276	328	5,273	94	204	356	85	739	6,012
1901	611	949	3,255	213	5,028	175	619	1,610	188	2,592	7,620
1902	627	770	2,387	430	4,214	134	470	971	124	1,699	5,913
1903	503	870	3,054	285	4,712	202	788	1,539	64	2,593	7,305
1904	518	900	3,456	645	5,519	89	481	926	21	1,517	7,036
1905	410	894	2,673	750	4,727	88	377	804	213	1,482	6,209
1906	501	1,055	3,599	666	5,821	82	269	597	121	1,069	6,890
1907	415	880	3,446	601	5,342	148	452	915	30	1,545	6,887
1908	338	1,048	3,406	377	5,069	156	571	1,187	10	1,924	6,993
1909	258	1,014	2,809	571	4,652	67	492	731	18	1,308	5,960
1910	358	948	2,334	689	4,329	91	335	617	32	1,075	5,404

COMMERCE.

Fiscal year.	Louisville and Portland Canal.			Open river.			Aggregate.
	Coal.	Other freight.	Total.	Coal.	Other freight.	Total.	
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons-*	*Tons.*	*Tons.*
1895	564,281	162,776	727,057	383,015	20,572	402,587	1,129,644
1896	989,957	285,766	1,275,723	390,260	35,954	426,214	1,701,937
1897	807,441	264,873	1,072,314	730,571	84,549	815,120	1,887,434
1898	859,411	289,353	1,148,764	516,728	53,226	569,954	1,718,718
1899	735,479	251,653	987,132	765,758	95,155	860,923	1,848,055
1900	1,008,524	273,274	1,281,798	274,215	18,181	292,396	1,574,194
1901	863,047	264,540	1,127,587	904,239	94,949	999,188	2,126,775
1902	496,278	351,344	847,622	530,555	95,424	625,979	1,473,601
1903	754,306	230,026	984,332	939,856	108,269	1,048,125	2,032,457
1904	1,413,063	144,328	1,557,391	498,808	43,119	541,927	2,099,318
1905	594,169	138,438	732,607	479,434	30,209	509,643	1,242,250
1906	867,514	186,012	1,053,526	352,005	31,143	383,148	1,436,674
1907	953,187	126,347½	1,079,534½	401,474	52,318	453,792	1,533,326½
1908	1,044,201½	127,038½	1,171,240	475,236	69,985½	545,221½	1,716,461½
1909	850,373½	112,954¼	963,327¾	319,434½	41,171	360,605½	1,323,933¼
1910	593,293¾	106,039¼	699,333	289,429	52,561	341,990	1,041,323

H H 3.

OPERATING AND CARE OF LOCK AND DAM AT GRAND RAPIDS, WABASH RIVER.

The project and estimate for the operation and care of this lock and its appurtenant structures during the fiscal year ending June 30, 1910, contained the following items:

Regular force	$1,200
Repairs	43,263
Miscellaneous	500
Total	44,963

In the item for repairs provision is made for the renewal of the old wooden guide cribs at the lock and a portion of the old wooden protection crib immediately below the abutment of the dam, backing the dam and dredging deposit from the lock chamber and approaches thereto. A contract for this work was entered into June 2, 1909, and approved June 28, 1909, but on account of slow progress made by the contractor, notwithstanding the excellent season for operations, the work is not yet completed. Provision is also made for renewing the lower slope of the dam and current repairs of a minor nature.

The following tabular statement shows the originally estimated quantity of work to be done under the contract for new guide walls and protection crib as well as that done to June 30, 1910:

Item.	Estimated quantity (cubic yards).	Done to June 30, 1910.
Concrete	1,207	1,234.11
Rock excavation	Nominal.	5.00
Crib excavation	3,782	3,588.00
Earth excavation	2,936	1,120.10
Embankment	881	881.00
Back fill	1,462	1,342.00
Dredging	7,000	9,663.00
Stone filling:		
Dam	800	800.00
Walls	1,207	757.60

A contract was made for the timber for repairs to the dam, and that material has all been received and stacked ready for use as soon as conditions for doing the work become favorable.

Minor repairs were made to the buildings, fences, etc., as became necessary.

Summary of expenditures on account of operating and care of lock and dam at Grand Rapids, Wabash River, during the fiscal year 1910, showing general items and amounts expended under each heading.

Item.	Amount.
Services	$4,893.17
Supplies	48.89
Materials	14,725.74
Miscellaneous	638.60
Total	20,306.40

ALLOTMENTS.

From act of July 5, 1884—	
March 12, 1897	$240.00
July 23, 1897	1,703.25
July 15, 1898	1,451.35
July 21, 1899	9,346.16
July 17, 1900	7,752.52
July 10, 1901	5,184.34
July 29, 1902	1,311.38
July 20, 1903	326.89
July 15, 1904	2,711.06
July 17, 1905	172.14
July 16, 1906	2,692.25
From act of July 5, 1884—	
July 12, 1907	$1,361.56
July 17, 1908	874.50
October 7, 1908	35,618.50
From act of March 3, 1909	9,356.16
	80,102.06
Collections.	
Sale of contact prints	11.70
Total	80,113.76

CONTRACT IN FORCE.

Contractor: Roetzel & Chipman.
Date of contract: June 2, 1909.
Date of approval of contract: June 28, 1909.
Date of notification of approval of contract: July 6, 1909.
Date for completion of contract: Within ninety working days from date of notification of approval of contract, working days being defined in specifications.
For work at prices as follows, quantities being estimated:

Kind of work.	Quantity.	Price per cubic yard.
	Cubic yards.	
Concrete	1,297	$11.25
Rock excavation	Nominal.	3.00
Crib excavation	3,782	.40
Earth excavation	2,936	.35
Embankment	881	.35
Backfill	1,462	.20
Dredging	7,000	.50
Stone filling (dam)	800	.25
Stone filling (walls)	1,207	.55

Liquidated damages: In case of failure to complete as agreed upon, $15 for each and every day of delay.

COMMERCIAL STATISTICS.

Statement of traffic and commerce passing the lock at Grand Rapids, Wabash River, for the fiscal year ending June 30, 1910.

TRAFFIC.

Kind of boat.	Number.	Tonnage.
Passenger	38	166
Tow	65	518
Barges	80	13,830
Small craft	108	258
Rafts	0	....
Total	291	14,772

Total number of lockages during the year is 223.

COMMERCE.

Article.	Quantity.
	Tons.
Corn	52¼
Shells	126¾
Lumber	8
Wheat	166
Stone	676
Miscellaneous	47¼
Total	1,076¼

Passengers, 86.

Comparative statement of traffic and commerce at lock at Grand Rapids, Wabash River.

Fiscal year.	Traffic.					Commerce.
	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.	
	Number.	*Number.*	*Number.*	*Number.*	*Number.*	*Tons.*
1897	60	80	27	130	297	3,749
1898	46	76	31	199	352	2,374
1899	45	53	32	118	248	2,417
1900	49	53	36	100	238	6,419
1901	62	68	25	112	267	2,364
1902	48	45	14	171	278	2,448
1903	91	82	10	114	297	2,747
1904	139	53	38	249	479	4,370
1905	220	90	45	1,042	1,397	8,025
1906	514	265	13	1,346	2,138	3,990½
1907	576	197	28	1,085	1,886	6,600½
1908	538	280	8	871	1,697	5,155¾
1909	527	204	22	741	1,494	5,121
1910	103	80	....	108	291	1,075½

H H 4.

IMPROVEMENT OF GREEN RIVER ABOVE THE MOUTH OF BIG BARREN RIVER, KENTUCKY.

No operations under this project were in progress, the funds being nearly exhausted and existing project completed.

Expenditures during the year, $335.13, were for payment of awards in condemnation proceedings to acquire land for a roadway from the abutment site of Dam No. 6, to the nearest public highway.

The project having been completed, it is proposed to carry the small balance available, $245.04, to the surplus fund of the Treasury and make no further report until additional funds become available for work on this river.

In the opinion of the district officer, this river is not worthy of further improvement, for the reason that the stream itself above the Mammoth Cave, Kentucky, is not susceptible of being made a highway of commerce.

APPROPRIATIONS.

July 13, 1892	$50,000.00	June 13, 1902	$180,000.00
August 18, 1894	25,000.00	March 3, 1905	5,000.00
June 3, 1896	20,000.00		
March 3, 1889	85,673.20	Total	365,673.20

COMMERCIAL STATISTICS.

Commercial statistics are given in the following report for "Operating and care of locks and dams on Green and Barren rivers, Kentucky."

H H 5.

OPERATING AND CARE OF LOCKS AND DAMS ON GREEN AND BARREN RIVERS, KENTUCKY.

Description of original condition will be found at page 728 of this report. References to more extended information will be found on page 498, Annual Report of the Chief of Engineers for 1904.

The project and estimate for the fiscal year ending June 30, 1910, approved July 17, 1909, provided as follows:

> It is proposed to operate the several locks and to make such repairs to them, the dams, guide cribs, dwellings, storehouses, and other government property at the several locks as are necessary to maintain the system and property in good condition, in connection with which work the snagging and dredging outfits will be operated to keep the pools, lock chambers, and entrances thereto free from snags, mud, leaves, and other obstructions brought into them by the varying stages of water; rebuild two derrick boats, build two new dump scows. The system now comprises seven locks and dams, viz, Nos. 1, 2, 3, 4, 5, and 6, Green River, and No. 1, Barren River, together with the lands and buildings owned by the United States.

The estimate for the fiscal year 1910 is summarized as follows:

Regular force	$42, 287. 00
Repairs	29, 001. 51
New dump scows	7, 000. 00
New derrick boats	5, 500. 00
Miscellaneous, supplies, and contingencies	5, 000. 00
Total	88, 788. 51

A general description of the work accomplished under the foregoing project and estimate follows.

The locks were kept open to all traffic throughout the year except for short periods while making needed repairs or while submerged by high water, during which latter traffic could pass over the dams. Such was the condition at Lock No. 1, Green River, 52 days during the year; at Lock No. 2, Green River, 54 days; at Lock No. 3, Green River, 16 days; at Lock No. 4, Green River, 16 days; at Lock No. 5, Green River, 10 days; at Lock No. 6, Green River, 5 days.

On account of repairs, Lock No. 1, Green River, was closed to traffic from August 30 to September 21, 1909, inclusive; Lock No. 4, Green River, from October 11 to 30, 1909, inclusive; Lock No. 5, Green River, from November 4 to 6, 1909, inclusive; Lock No. 6, Green River, from November 9 to 12, 1909, inclusive; and Lock No. 1, Barren River, from November 18 to 19, 1909, inclusive. On account of ice, these rivers could not be navigated for a short period during the early part of January, 1910.

The mud deposit and drift were cleaned from the lock walls, cribs, and approaches after each high stage of the water; snags and other obstructions removed from the pools as needed; the lock gates, gauges, flag poles, rowboats, and metal roofs repainted, and fences and outbuildings whitewashed once during the year; the grass, weeds, and other refuse removed from the reservations as needed; shade trees reset, buildings repaired, and other minor repairs made from time to time as became necessary in maintaining the system in good navigable condition and the public property in a useful state of preservation. The greater part of this work was performed by the regular force, but extra labor was necessary in some instances.

LOCK NO. 1, GREEN RIVER.

The upper miter wall was rebuilt with concrete and new steel upper gates installed. The gates were built under contract by Charles Hegewald Company, of New Albany, Ind., and the concrete miter wall and the installation of gates by hired labor, assisted by the United States floating plant. The work was begun August 1 and completed September 30, 1909, when the old lock gates and the old timber removed from the old wall were collected and burned.

While the work was in progress the upper miter sills were renewed, also the lower section of the hollow quoin behind each upper gate; repairs made to breaks in channels carrying the miter post of each lower gate; and a new coffer sill framed and placed at lower end of chamber and the space between this and the lower miter sills reenforced with a layer of double strength concrete (13 cubic yards). Slight repairs were also made to the lower valves.

The cost of the work is made up as follows:

Labor	$2,644.12
Material	3,492.58
Barge hire	35.00
Traveling expenses	3.95
Total	6,175.65

This expenditure is divided thus:

Expended to June 30, 1909	$2,571.19
Expended during fiscal year 1910	3,604.46
Total	6,175.65

The expenditure for miscellaneous supplies at this lock, such as paints, oil, lime, skiff, ladders, material for repairs to dwellings, etc., amounted to $171.43.

LOCK NO. 2, GREEN RIVER.

The above-water portion of four sections of the old wooden upper river sectional guide crib was rebuilt with concrete, the old crib work retained as foundation being first strengthened by round beech piles driven therein. New grillage was then framed between the several new sections and a walkway built thereon. The cost of the work is made up as follows:

Labor	$1,640.82
Material	602.43
Barge hire	35.00
Total	2,278.25

The expenditure is divided thus:

Expended to June 30, 1909	$455.75
Expended during fiscal year 1910	1,822.50
Total	2,278.25

Well.—An open well, located midway between the storehouse and lockmaster's dwelling, was dug to a depth of 28½ feet, walled with limestone slabs to a height one-half foot above surface of the earth and here constructed a concrete top, 6 feet wide. 6 feet long and 2 feet high; a small shed over all was erected. The cost of this well is made up as follows:

Labor	$160.50
Material	33.95
Total	194.45

Dam.—A section of the apron, 119 feet long, which was washed away during high water, was replaced with new timber, 2,927 lineal feet 10-inch by 10-inch beech being used and 184 cubic yards rubble stone filling. To better secure this work and prevent a recurrence holes were drilled into the slate foundation, wooden pins forced into these holes, and long spikes through the timbers and into these pins; 5½-foot spikes being used to secure the stringers and 4-foot spikes to secure the ties. The cost of these repairs is made up as follows:

Labor	$251.74
Material	305.00
Total	556.74

Bridge.—The old wooden bridge across the mill race was reconstructed—the abutments of concrete, the floor beams of steel, and the floor of heavy white oak timber taken from the old timber found under the abutments. In the execution of this work it was necessary to construct a cofferdam across mill race and do extensive excavating. One old cut-stone abutment was entirely removed except a small portion of the backfill; the other partly removed. The new abutments were placed immediately in front of the old masonry and have for a foundation slate rock at a depth slightly below the old foundations. All necessary backfill has been placed, and suitable approaches made to each end of the bridge. The cost of the work, exclusive of floating plant which supplied the sand and gravel for the concrete, etc., is made up as follows:

Labor	$2,537.00
Material	456.69
Team hire	126.20
Total	3,119.89

New lower steel gates.—These gates have been received, the necessary timber for heel and toe posts contracted for, and the gates will be installed whenever the stage of the water becomes favorable for placing coffers and unwatering the pit. The gates were built under contract by the Louisville Bridge and Iron Company at a cost of $2,929. The cost of labor in placing the necessary blocking on board United States barge was $18.40.

Miscellaneous.—Considerable expenditure for labor was necessary here to remove, by use of clamshell bucket, the mud and leaves which were deposited in the lock chamber and near the upper gates by the several high stages of the water during the year, also for grading fill behind upper land guide crib, and for a new skiff, ladders, paints, oil, and other miscellaneous repair materials. This expense amounted to $569.98.

LOCK NO. 3, GREEN RIVER.

The top of the upper section of the old timber upper river sectional guide crib was removed to a point about 1 foot below upper pool level and rebuilt with sound timber at a cost of $316.56.

New upper steel gates have been received, the necessary timber for heel and toe posts and miter sills contracted for, and the gates will be installed whenever river conditions will admit.

Gates built under contract by the Louisville Bridge and Iron Company—cost to the United States	$2, 070. 00
Expended for labor blocking up gates on barge	18. 40
Expended for labor transferring and unloading one gate at this lock	41. 95
Total expenditure to June 30, 1910	2, 130. 35

Miscellaneous.—This work consisted of certain repairs to dwellings, to walkway on lower shore crib, to lower valves, and the removal of deposits from the upper approach and lock pit after each high stage of the river, and, together with a new skiff, ladders, paints, oil, and miscellaneous repair material, cost $378.78.

New heel posts for lower steel gates.—The timber has been contracted for and will be framed and put on the gates during the installation of new upper gates.

LOCK NO. 4, GREEN RIVER.

The upper miter wall was rebuilt with concrete, upper miter sills, anchor bars, and the lower section of hollow quoin behind each upper gate renewed, and new steel upper gates installed. The gates were built under contract by Charles Hegewald Company; the installation, reconstruction of wall, etc., by hired labor, assisted by United States floating plant. The sand and gravel used in the concrete was dredged from bars near Mammoth Cave and transferred to the lock by United States boats. In the execution of this work it was necessary to place coffers at each end of the lock and unwater the chamber. When this was done, it was discovered that the lower gates and wickets needed considerable repairs, the channels carrying the miter posts being broken and the lower section of each of these posts somewhat rotted. A steel plate was riveted over the break in each channel, and this section of miter post replaced with new timber. The anchor bars and bolts were also renewed, and the gates restored to their usual height by the insertion of heavy pieces of iron under the old pintle seats. A new coffer sill was framed and placed at the lower end of pit, and this reenforced with a layer of concrete (14 cubic yards). The cost of this work is made up as follows:

Labor	$2, 666. 92
Material	3, 213. 26
Total	5, 880. 18

This expenditure is divided thus:

Expended to June 30, 1909	$2, 696. 54
Expended during fiscal year 1910	3, 183. 64
Total	5, 880. 18

Miscellaneous.—The porches, windows, doors, roofs, etc., of the two dwellings were repaired; also the roadway up the hill to these dwellings. A new skiff, extension ladders, paints for repainting gates and houses, oil, and other miscellaneous repair material were purchased. Cost, $253.77.

During the winter season the machinery, concrete mixer, tools, etc., stored at this lock were overhauled and put in good condition; the entire stock of material, fittings, etc., rehandled and rechecked, and the unserviceable property collected; a larger workshop and office framed inside of main storehouse, a flue built and stove installed; the irons from the old upper lock gates collected and stored; a quantity of lumber was received and stored in lumber house; the two old unserviceable dump scows beached; paints, oil, and repair material assembled and distributed to the several locks and United States boats; a quantity of lumber, cement, etc., rehandled and restored, and the plant watched and cared for. The expenditures on account of this miscellaneous work, including cost of some tools, fittings, and supplies for replenishing stock in warehouse and not chargeable against any special item, was as follows:

Labor	$485.50
Material, etc	1,619.61
Total	2,105.11

LOCK NO. 5, GREEN RIVER.

On October 4, 1909, the chamber was unwatered in order to ascertain the true condition of the lock floor and locate the exact point of leakage. The necessary coffers were placed at either end of the lock and when the water was reduced to a point 3 feet 2 inches below lower pool level a strong leak showed up at the usual place near the center of the chamber. After continuous pumping the water was then reduced to a depth of about 11 inches on floor and kept at this stage by the continuous operation of one 10-inch centrifugal pump at about two-thirds of its capacity. The necessary inspection being completed, the coffers were removed and the lock reopened to traffic on the 6th of that month, the conclusion having been reached that this leakage comes from lower pool under river wall at its juncture with the dam and was not of a serious nature. The snag boat and dredge assisted in unwatering the chamber. The cost of same, exclusive of the time of the crews of these two boats, was, for labor, $172.33.

The old wooden "catch basin" or sink at the head of the line of 24-inch tile, which conveys the water from the branch that crosses the reservation and drains the greater portion of the hill land to the river, was removed, the sewer extended up the drain about 23 feet, and another receiver built of concrete. Repairs were made to the slope adjoining the lower side of the abutment where a break appeared in the grouted riprap. Cedar brush and rubblestone were dumped into the break and the surface repaved. Slight repairs were made to the roadway and to the dwellings.

The cost of this miscellaneous work, including cost of a new skiff, two extension ladders, paints, oil, and other repair material, was $383.40.

LOCK NO. 6, GREEN RIVER.

One hundred and six square yards of slope below the abutment were graded and protected with riprap and 150 cubic yards stone quarried, while blasting out roadway, for further protection here; cost, $111.20.

Two hundred and seventy-seven large derrick stone were placed in the river as a footing below the dam, at a cost of $107.92; repairs were made to a break in channel carrying the miter post on lower shore gate; a closet erected back of lockman's cottage; the reservation on the abutment side of the river inclosed with woven-wire fencing; and repairs made to the two dwellings. The expenditure on account of this miscellaneous work, including cost of a new skiff, ladders, paints, oil, and other minor repair material, was $358.54.

The roadway recently purchased on the abutment side of the river at this lock, extending from the reservation to the county road, a distance of about 5,000 feet, was opened up, graded, and fenced; trees stumps, and bowlders removed where found necessary; fills made where needed and culverts placed across the branches. The greater part of this road was over very irregular ground, which required considerable drilling, blasting, and excavating in places and filling and walling at other points, and was very difficult, slow, and expensive work. The cost of this work is made up as follows:

Labor	$876.96
Material	286.25
Team hire	70.35
Total	1,233.56

LOCK NO. 1, BARREN RIVER.

Some needed repairs were made to the apron of the dam, 87 pieces 10-inch by 10-inch sheeting being renewed and 22 cubic yards stone filling replaced, at a cost of $73 for labor and $183.55 for material; total, $256.55.

A break in the river leaf of the lower steel gate was also repaired, valve rods and rack renewed in both lower gates, and needed repairs made to porches, windows, doors, etc., of the two dwellings. The expenditure on account of this work, including cost of a new skiff, ladders, paints, oil, and other repair material, was $258.10.

NOLIN RIVER.

One of the Green River derrick boats, rigged for snagging and manned by a crew of seven men, was employed in snagging operations on this river three days and during that time removed 20 snags and 6 overhanging trees and 120 cubic yards mud and leaves. Cost for labor was $54.

SURVEYING CLAIMS ON ACCOUNT OF OVERFLOW, UPPER GREEN AND NOLIN RIVERS.

Two laborers were employed to assist a surveyor in this work eighty-four days and four hours at a cost of $135.20.

FLOATING PLANT.

Steamer Mammoth Cave.—This boat was in active service from July 1 to December 9, 1909, January 18 to 22, 1910, and May 12 to the close of the fiscal year, engaged in removing obstructions from the several pools, towing material for the repair work at the several locks and assisting in that work, and in making inspection trips. Following is a summary of work done:

As snag boat:	
Snags removed between mouth of Green River and Lock No. 1, Green River	16
Snags removed, pool No. 1, Green River	120
Snags removed, pool No. 2, Green River	122
Snags removed, pool No. 3, Green River	84
Snags removed, pool No. 4, Green River	56
Trees removed, pool No. 4, Green River	69
Trees deadened, pool No. 4, Green River	46
Snags removed, pool No. 5, Green River	75
Snags removed, pool No. 6, Green River	12
Snags removed, pool No. 1, Barren River	43
Trees removed, pool No. 1, Barren River	41
Snags removed, pool No. 2, Barren River	14
Trees removed, pool No. 2, Barren River	17
Trees deadened, pool No. 2, Barren River	103
Miles run as snag boat	1,659
As towboat:	
Derrick boats towed	17
Dredges towed	5
Scows towed	4
Barges towed	23
Quarter boats towed	2
Miles run as towboat	1,600
As miscellaneous:	
Trips made	7
Miles run as miscellaneous	928

During the winter season the machinery and equipment was thoroughly overhauled and repaired where needed, the supply tanks in hull enlarged, engines relined, packing renewed, heaters in boilers and furnaces repaired, scale removed from boilers and boilers tested, fusible plugs refilled, the inside of hull cleaned and painted, also roof, stacks, cabin, and machinery, the main deck forward of boilers recalked, the wheel overhauled, circles and arms cut down so as to render wheel 1 foot less in diameter, rudder repaired, new hose and hose reels installed, also a watchman's clock, a new skiff purchased, and other minor repairs made. The cost of these repairs is made up as follows:

Labor	$610.50
Material	691.71
Total	1,302.21

Steamer Shawnee.—This boat arrived on Green River August 2, 1909, and was engaged in active service from that date to December 10, 1909, and again from March 28 to April 4, 1910, and April 27 to the close of the fiscal year, and was engaged in miscellaneous towing in connection with the repair work at the several locks on Green, Barren, and Rough rivers, in inspection work and acting as dredge tender, as follows:

As towboat:	
Derrick boats towed	24
Dredges towed	8
Barges towed	76
Quarter boats towed	2
Scows towed	7
Miles run as towboat	3,328

As dredge tender:	
Scows towed	87
Miles run as dredge tender	150
As miscellaneous:	
Trips made	6
Miles run as miscellaneous	1,176

On December 9, 1909, the unprotected woodwork just over the boilers on this boat caught fire and was considerably charred and damaged. During the winter season this damaged section was removed and replaced with new timber and, together with all adjacent woodwork, covered with celasbestos fireproof sheeting and galvanized sheet iron. This new work and all pipes, stacks, wheel, roof, and machinery was then painted. Two new injectors, two supply tanks in hull, window and door screens, new hose and hose reels, and a watchman's clock were installed; the speaking and bell trumpets and bell cord renewed; 10 swinging fenders and 3 boiler-deck stanchions, a locker in engine room, and a coal bunker amidship framed and placed; all pipes and machinery overhauled and repaired, packing and fittings renewed where found needed; a new skiff and cook stove purchased, also a forge and other tools, and a blacksmith shop fitted up aboard. The cost of these repairs, new equipment, etc., is made up as follows:

Labor	$474.35
Material	626.99
Total	1,101.34

Dredge Green River.—This boat was in commission from July 1 to December 14, 1909, and from June 20 to the close of the fiscal year, and was engaged in dredging operations and in assisting in the repairs at the several locks. A summary of work done follows:

Near Bowling Green, Barren River, barges removed 3; logs, 8.

Lock No. 1, Green River:		
Mud and leaves from lower approach	cubic yards	3,145
Mud and leaves from upper approach	do	185
Logs from lower approach	number	3
Mud and leaves from lock chamber	cubic yards	57
Lock No. 2, Green River:		
Mud and leaves from lower approach	do	2,850
Mud and leaves from upper approach	do	2,470
Logs from lower approach	number	17
Near Aberdeen coal tip:		
Mud and leaves removed	cubic yards	550
Sunken barges removed	number	3
Bar below Lock No. 4, Green River:		
Material removed	cubic yards	1,350
Old coffer above Lock No. 4, Green River:		
Material removed and cast as backing to dam	do	550
Logs removed	number	41
Massey Spring Landing:		
Material removed	cubic yards	50
Logs removed	number	1
Tunks Island:		
Material removed	cubic yards	4,900
Logs removed	number	22
Gunthers Cave:		
Material removed	cubic yards	60
Logs removed	number	3
Bar near Mammoth Cave Landing:		
Material removed	cubic yards	2,460
Logs removed	number	60

Two hundred and fifty cubic yards of the sand and gravel removed at this point was loaded onto barges and transferred to and used in the concrete work at Lock No. 2, Green River, and 580 cubic yards in the work at Lock No. 4, Green River.

During the winter season the machinery was overhauled and repaired and, together with roof and stacks, repainted; the sides and main deck recalked and payed with red lead; cabin and deck patched in several places; the chain trough repaired; four timber heads, one kevel, and one large chock block renewed; a new inspirator, cook stove, watchman's clock, skiff, and water hose installed. The cost of these repairs, exclusive of the services of the engineman, who did considerable work on the machinery, was as follows:

Labor	$160.20
Material	216.09
Total	376.29

Derrick boat No. 3.—This boat, manned by seven men, assisted in the repair work at the several locks, and also rendered services in removing deposit from the lock chambers and approaches and in grading behind the upper shore wall at Lock No. 2, Green River. A summary of the latter work follows:

Lock No. 2, Green River:		
Mud and leaves from upper approach	cubic yards	2,595
Mud and leaves from lock chamber	do	195
Material handled in grading slope	do	700
Lock No. 3, Green River:		
Mud and leaves from upper approach	do	440
Mud and leaves from lower approach	do	210

During the winter season 121 square feet of the deck was renewed and the entire deck and gunwale seams above the water line recalked and payed; machinery overhauled and repaired; new friction blocks and other new fittings installed; the position of the steam winch again changed and the rigging adjusted to better enable the operator to handle clam-shell bucket while dredging, and the machinery, stack, and roof repainted. The cost of these repairs was as follows:

Labor	$121.60
Material	136.87
Total	258.47

New derrick boats.—Timber for rebuilding derrick boats *Nos. 1* and *2* has been received, transferred to Lock No. 4, Green River, unloaded and stored convenient for the work, and the work of framing hulls begun June 20. The necessary oakum, corner bands, roofing, etc., have also been purchased. The expenditure to date on account of this project, exclusive of the cost of the yellow pine timber, which can not be definitely stated at this time, has been as follows:

Labor	$299.03
Material	239.89
Team hire	95.75
Total expenditure to June 30, 1910	634.67

Barges Nos. 1, 2, and 3.—The hulls of these boats were thoroughly cleaned out and all gunwale and rake seams above water line recalked and payed with red lead at a cost of $86.20.

Quarter boat.—Two kevels were renewed on this boat, the roof patched and painted and the gunwale seams above the water line recalked and payed with red lead at a cost of $15.90.

The description of operations, etc., in this report is taken from the report of W. S. Overstreet, master, who has had local supervision of the work throughout the year.

Summary of expenditures on account of "Operating and care of Green and Barren rivers, Kentucky," fiscal year 1910, showing general items and amount expended under each heading.

Items.	Amount.
Services	$52,624.75
Supplies	5,135.59
Materials	17,550.34
Miscellaneous	561.27
Total	75,871.95

COLLECTIONS.

1909.

July 1. Jett & Turner, water power, etc., Lock No. 2, Green River	$50
July 7. William Boulton, water power, Lock No. 1, Barren River	75

1910.

Jan. 7. Craig Bros., water power, etc., Lock No. 3, Green River	75
Jan. 7. Jett & Turner, water power, etc., Lock No. 2, Green River	50
Jan. 13. R. C. Bryant, water power, Lock No. 2, Green River	150
Total	400

All of these collections were deposited to the credit of the Treasurer of the United States.

APPROPRIATIONS AND ALLOTMENTS.

APPROPRIATION.

Act of August 11, 1888	$135,000.00

ALLOTMENTS.

From act of July 5, 1884—	
January 4, 1889	$167,112.00
July 20, 1889	139,110.00
July 17, 1890	53,783.47
July 16, 1891	77,807.26
July 15, 1892	46,264.26
July 15, 1893	49,730.88
July 13, 1894	25,927.23
January 26, 1895	6,000.00
July 20, 1896	51,080.31
September 2, 1896	77,684.35
July 23, 1897	57,459.61
July 15, 1898	70,219.76
July 22, 1899	65,007.65
From act of July 5, 1884—	
July 17, 1900	$69,349.64
July 10, 1901	43,236.82
July 30, 1902	105,629.33
July 20, 1903	34,720.47
July 25, 1904	23,610.25
July 17, 1905	48,517.10
July 16, 1906	73,129.48
July 22, 1907	96,856.93
September 21, 1907	40,000.00
July 15, 1908	89,016.40
July 17, 1909[a]	69,652.57
	1,715,905.76

[a] Act of March 3, 1909.

CONTRACT IN FORCE.

Contractor: R. M. Cunningham.
Date of contract: November 15, 1909.
Date for completion of contract: On or before February 10, 1910.
For lumber for repair of derrick boats, etc., as follows:

Long-leaf yellow pine.

	Pieces.	Thickness.	Width.	Length.
	Number.	*Inches.*	*Inches.*	*Feet.*
Bottom gunwales	8	8	16	40
Gunwales	4	6	14	44
Do	12	6	14	28
Do	8	6	14	20
Bulkheads	18	4	12	16
Do	12	4	16	28
Do	8	4	16	22
Do	4	4	16	40
Head blocks	4	17	12	26
Do	4	18	6	26
Floor beams	16	12	10	26
Rake beams	8	6	8	26
Rake frames	24	4	14	14
Deck beams	70	4	6	26
Stiffeners	8	6	12	16
Shores	80	4	4	18
Streamers	66	4	10	22
Kevels	6	7	8	12
Bottom planking	160	3	12	26
Decking	400	2½	6	20
Do	20	2¼	12	20
Base blocks	2	12	18	16
Do	2	6	18	12
Masts	2	14	12	40
Booms	2	14	16	66
Stiff legs	4	12	12	46
Do	4	12	12	54
Rakes and bottom	40	3½	12	32
Do	40	3	12	26
Do	40	3	12	24
Do	40	3	12	22
Forms	100	2½	12	20
Do	150	2½	12	16
Needles	200	3½	12	12
Barge repairs	100	2½	6	20
Do	100	2	6	20
Repairs to buildings	50	1¾	5	24
Do	50	1½	16	22
Do	100	⅞	12	20
Do	150	2	4	16
Do	40	4	4	18
Do	20	3	16	18

Price for the entire lot, $3,780.
Contract carried on under an implied waiver of time limit.

COMMERCIAL STATISTICS.

Statement of traffic passing the locks on Green and Barren rivers from July 1, 1909, to June 30, 1910.

Kind of craft.	Green River.							
	Lock No. 1.		Lock No. 2.		Lock No. 3.		Lock No. 4.	
	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
Passenger boats	538	51,987	547	51,877	1,071	57,164	971	80,589
Towboats	718	32,386	415	11,801	137	6,632	232	11,347
Government boats	41	4,138	45	5,105	60	10,502	97	12,229
Barges	1,800	415,779	785	320,491	369	176,732	366	142,361
Small craft	752	6,826	612	4,742	416	2,297	404	1,910
Rafts	210	....	207	....	107	....	46	....
Total	4,059	511,116	2,611	394,016	2,160	253,327	2,116	248,436
Lockages, fiscal year	3,225	....	2,181	....	2,243	....	2,037	....

Statement of traffic passing the locks on Green and Barren rivers from July 1, 1909, to June 30, 1910—Continued.

Kind of craft.	Green River.				Barren River.	
	Lock No. 5.		Lock No. 6.		Lock No. 1.	
	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
Passenger boats	207	20,409	145	14,936	1,166	82,676
Towboats	179	7,383	106	5,053	159	7,281
Government boats	55	7,844	29	4,442	56	8,509
Barges	394	153,262	154	66,921	295	94,046
Small craft	330	2,045	802	1,833	246	1,136
Rafts	21	....	32	....	3	....
Total	1,186	190,943	1,268	93,185	1,925	193,648
Lockages, fiscal year	1,117	....	1,348	....	1,879	....

Statement of commerce passing the locks on Green and Barren rivers from July 1, 1909, to June 30, 1910.

Articles.	Green River.						Barren River, Lock No. 1.
	Lock No. 1.	Lock No. 2.	Lock No. 3.	Lock No. 4.	Lock No. 5.	Lock No. 6.	
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Coal	29,851	723	280	4,537	1,535	63	4,464
Corn	1,482	991	548	350	30	11	350
Wheat	129	81	109	29	....	....	37
Salt	1.264	831	380	200	98	55	142
Oil	398	282	241	116	56	19	110
Flour	1,743	1,461	769	368	227	89	417
Sugar	931	783	408	115	48	10	125
Molasses	64	30	32	6	6	1	2
Cement	343	330	64	61	28	1	11
Tobacco	3,476	2,269	826	1	....	....	3
Hides	1	1	½	....	....	....	....
Hay	328	195	95	154	33	32	211
Straw	9	4	3	4	1	....	1
Cattle	1,844	1,269	615	73	4	2	21
Swine and sheep	1,366	706	378	158	4	....	89
Horses and mules	78	62	66	96	....	....	90
Lumber	5,070	3.581	211	143	160	247	420
Timber	100,104	76,140	41,288	13,029	10,700	8,556	2,917
Staves	17,494	16,729	111	86	....	....	32
Shingles	54	11	6	6	3	....	3
Ties, railroad	68,716	59,138	53,741	34,938	26,836	17,316	761
Hoop poles	831	835	36	....	....	....	....
Manufactured iron	87	64½	36½	42½	32½	27½	43
Asphalt	....	....	....	....	10,488	....	10,488
Miscellaneous	22,536½	18,837	11,850	6,272½	2,111	940	6,451½
Total	258,199½	185,353½	112,094	60,785½	52,400½	27,369½	27,188½
Passengers ... number	9,502	6,386	9,010	9,718	2,773	3,496	12,163

Comparative statement of traffic and commerce on Green and Barren rivers, Kentucky.

Fiscal year.	Traffic.									
	Lock No. 1, Green River.					Lock No. 2, Green River.				
	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
1889	284	129	350	138	901	272	107	300	15	694
1890	854	386	1,079	111	2,430	776	286	768	12	1,842
1891	875	456	1,082	152	2,565	768	358	721	24	1,871
1892	787	449	898	184	2,318	634	272	785	6	1,697
1893	823	506	914	161	2,404	304	379	745	9	1,437
1894	832	437	602	176	2,047	477	333	413	9	1,232
1895	789	606	240	264	1,899	652	494	152	46	1,344
1896	1,143	553	620	162	2,478	702	469	440	168	1,779
1897	919	539	226	157	1,841	935	632	239	252	2,058
1898	1,122	882	340	200	2,544	1,037	847	260	182	2,326
1899	1,174	803	570	169	2,716	948	819	469	184	2,420
1900	1,088	1,239	481	132	2,940	946	1,087	521	156	2,710
1901	1,360	1,765	592	139	3,856	1,220	1,443	302	137	3,102
1902	992	1,113	530	137	2,772	820	927	364	255	2,366
1903	1,077	1,403	608	158	3,246	982	1,044	408	229	2,663
1904	1,378	2,127	338	185	4,028	1,105	1,384	227	207	2,923
1905	1,339	2,275	454	253	4,321	1,058	1,297	350	231	2,939
1906	1,449	1,729	262	377	3,817	1,095	1,033	322	236	2,686
1907	1,531	2,525	309	542	4,907	1,221	937	283	297	2,738
1908	1,706	2,910	294	546	5,456	1,148	1,440	290	278	3,156
1909	1,380	1,948	325	826	4,479	963	899	271	352	2,485
1910	1,297	1,800	210	752	4,059	1,007	785	207	612	2,611

Comparative statement of traffic and commerce on Green and Barren rivers, Kentucky.

Fiscal year.	Traffic.									
	Lock No. 3, Green River.					Lock No. 4, Green River.				
	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
1889	....	....	200	....	200	115	49	41	51	256
1890	....	....	....	....	....	126	55	36	123	340
1891	225	57	372	101	755	399	141	87	134	761
1892	492	305	426	212	1,435	619	276	208	129	1,232
1893	509	269	560	249	1,587	553	333	292	144	1,332
1894	611	469	304	227	1,611	592	391	117	115	1,215
1895	711	456	123	212	1,502	866	471	54	116	1,507
1896	880	486	234	238	1,838	1,307	676	112	102	2,197
1897	867	522	103	144	1,636	1,249	820	53	53	2,175
1898	835	613	133	167	1,748	1,192	884	39	176	2,291
1899	712	532	315	220	1,779	1,073	828	159	141	2.201
1900	750	695	288	158	1,891	1,099	929	122	138	2.288
1901	1,019	1,081	202	108	2.410	1,347	1,017	75	141	2.580
1902	757	780	293	223	2,053	1,012	814	102	229	2,157
1903	717	707	278	233	1,935	1,049	763	111	249	2,172
1904	827	893	191	146	2,057	910	817	68	86	1.881
1905	775	910	301	171	2,157	1,115	917	84	103	2.219
1906	1,111	645	274	262	2,292	957	726	117	108	1.908
1907	1,366	773	114	203	2,456	1,224	891	111	212	2,438
1908	1,654	1,154	226	278	3,312	1,228	987	90	206	2,510
1909	1,457	668	195	354	2,674	1,557	695	81	328	2,661
1910	1,268	369	107	416	2,160	1,300	366	46	404	2,116

Comparative statement of traffic and commerce on Green and Barren rivers, Kentucky.

Fiscal year.	Traffic.									
	Lock No. 5, Green River.					Lock No. 6, Green River.				
	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
1889	......	......	......	......	......	......	......	......	......	......
1890	......	......	......	......	......	......	......	......	......	......
1891	......	......	......	......	......	......	......	......	......	......
1892	......	......	......	......	......	......	......	......	......	......
1893	......	......	......	......	......	......	......	......	......	......
1894	......	......	......	......	......	......	......	......	......	......
1895	......	......	......	......	......	......	......	......	......	......
1896	......	......	......	......	......	......	......	......	......	......
1897	......	......	......	......	......	......	......	......	......	......
1898	......	......	......	......	......	......	......	......	......	......
1899	......	......	......	......	......	......	......	......	......	......
1900	238	255	47	76	616	......	......	......	......	......
1901	376	383	29	217	1,005	......	......	......	......	......
1902	391	388	53	182	1,014	......	......	......	......	......
1903	393	465	59	208	1,125	......	......	......	......	......
1904	520	646	49	207	1,422	......	......	......	......	......
1905	731	633	87	272	1,723	......	......	......	......	......
1906	774	480	73	104	1,431	290	167	52	123	632
1907	690	570	57	119	1,436	446	334	47	473	1,300
1908	599	661	45	161	1,466	419	354	35	695	1,503
1909	563	557	50	317	1,487	415	318	38	700	1,471
1910	441	394	21	330	1,186	280	154	32	802	1,268

Comparative statement of traffic and commerce on Green and Barren rivers, Kentucky.

Fiscal year.	Traffic.				
	Lock No. 1, Barren River.				
	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.
	No.	*No.*	*No.*	*No.*	*No.*
1889	112	57	10	85	264
1890	23	20	8	13	64
1891	342	177	7	3	529
1892	555	180	36	30	801
1893	518	290	32	14	854
1894	534	347	22	42	945
1895	618	335	32	56	1,041
1896	859	351	15	36	1,261
1897	842	451	10	104	1,407
1898	789	553	1	86	1,429
1899	826	528	3	119	1,476
1900	797	462	4	103	1,366
1901	992	497	20	93	1,602
1902	859	499	10	108	1,476
1903	1,066	653	13	120	1,852
1904	819	486	5	53	1,363
1905	961	404	1	159	1,525
1906	1,212	462	8	71	1,753
1907	998	445	9	78	1,530
1908	748	355	5	140	1,348
1909	1,388	369	2	180	1,939
1910	1,381	295	3	246	1,925

Comparative statement of traffic and commerce on Green and Barren rivers, Kentucky.

Fiscal year.	Commerce.						
	Green River.						Barren River, Lock No. 1.
	Lock No. 1.	Lock No. 2.	Lock No. 3.	Lock No. 4.	Lock No. 5.	Lock No. 6.	
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1889	....	....	....	....	....	....	....
1890	....	....	....	....	....	....	....
1891	....	....	....	....	....	....	....
1892	....	....	....	....	....	....	....
1893	....	....	....	....	....	....	....
1894	....	....	....	....	....	....	....
1895	....	....	....	....	....	....	....
1896	....	....	....	....	....	....	....
1897	....	....	....	....	....	....	....
1898	193,475	161,841	109,107	84,761	....	....	28,483
1899	257,104	184,895	84,139	43,973	....	....	43,504
1900	378,684	288,948	172,016	139,530	47,098	....	33,355
1901	452,522	285,744	183,512	117,054	57,058	....	46,445
1902	385,548	242,722	153,087	110,468	47,940	....	30,616
1903	457,386	259,142	165,746	106,119	59,525	....	48,738
1904	329,896	253,979	179,702	108,294	69,226	....	32,983
1905	466,015	303,274	257,181	157,208	107,848	....	38,496
1906	342,495	242,601	201,012	111,316	75,468	34,325	61,030
1907	372,915	271,762	205,497	135,320	95,099	58,621	43,993
1908	476,274	353,269	293,882	167,227½	108,887	65,309	37,201
1909	383,581¾	251,671	197,477½	122,508¾	88,350½	46,883	30,787¾
1910	253,199½	185,353½	112,094	60,785¼	52,400½	27,369½	27,188¾

H H 6.

OPERATING AND CARE OF LOCK AND DAM ON ROUGH RIVER, KENTUCKY.

The estimate and project for the operation and care of this lock and its appurtenant structures during the fiscal year ending June 30, 1910, contained the following items, the funds for which were made available July 15, 1909:

Regular force	$708
Repairs, supplies, etc	800
Total	1,508

The lock was open to traffic three hundred and eighteen days during the year; it was closed thirty days on account of high water and seventeen days on account of ice; in the latter cases traffic passed over the dam.

During the year the lock gates, gauges, snubbing posts, and rowboat were repainted, fences and outbuildings whitewashed, mud and drift removed from the lock walls, cribs, and approaches after each high stage of water, slight repairs made to the apron of the dam and to steps to the dwelling, grass and weeds cut from the grounds, and snags, slides, and other obstructions removed from the river as far upstream as Hartford, Ky. A summary of the work follows.

Snags removed	112
Stumps removed	47
Whole trees removed	304
Mud removed ..... cubic yards	2,534
Trees deadened	70
Miles worked over	30

Summary of expenditures on account of operating and care of Rough River, Kentucky, during the fiscal year 1910, showing general items and amount expended under each heading.

Items.	Amount.
Services	$1,168.78
Supplies	38.36
Materials	97.25
Miscellaneous	.00
Total	1,304.39

ALLOTMENTS.

From act of July 5, 1884:		From act of July 5, 1884—Continued.	
July 23, 1897	$2,086.00	July 12, 1906	$1,013.95
July 22, 1899	714.97	July 12, 1907	1,363.07
July 17, 1900	686.31	July 17, 1908	980.15
July 10, 1901	763.66	July 15, 1909 [a]	1,090.76
August 5, 1902	1,079.62		
July 20, 1903	664.03	Total	12,589.22
July 14, 1904	1,029.66		
July 17, 1905	1,117.04		

[a] Act of March 3, 1909.

COMMERCIAL STATISTICS.

Statements of traffic and commerce passing Lock No. 1, Rough River, Kentucky, from July 1, 1909, to June 30, 1910.

TRAFFIC.

Kind of boat.	Number.	Tonnage.
Passenger	164	2,009
Tow	49	742
Government	6	550
Barges	88	9,457
Small craft	402	1,974
Rafts	74	....
Total	783	14,732

Total number of lockages during the fiscal year 1910, 676.

COMMERCE.

Articles.	Quantity.	Articles.	Quantity.
	Tons.		*Tons.*
Coal	16	Cattle	2
Corn	95	Swine and sheep	2
Wheat	117	Lumber	129
Salt	60	Timber	21,928
Oil	36	Ties, railroad	341
Flour	84	Manufactured iron	9½
Sugar	44	Miscellaneous	523
Cement	39		
Hay	14	Total	23,439½

Number of passengers, 408.

Comparative statement of traffic and commerce at Lock No. 1, Rough River, Kentucky.

Fiscal year.	Traffic.					Commerce.
	Steamboats.	Barges and flats.	Rafts.	Miscellaneous.	Total.	
						Tons.
1891						98,161
1892						50,000
1893						75,000
1894						64,401
1895						36,945
1896						30,445
1897						16,538
1898	81	70	178	154	483	15,488
1899	164	29	207	132	532	21,831
1900	260	72	270	168	770	41,411
1901	175	114	121	247	657	20,666
1902	98	105	111	191	505	21,703
1903	128	76	133	235	572	32,919
1904	182	216	115	137	650	33,076
1905	192	219	160	126	697	55,333
1906	257	164	151	303	875	36,800
1907	202	75	144	434	855	30,084
1908	217	95	151	457	920	37,163
1909	146	80	49	300	575	21,332[illegible]
1910	219	88	74	402	783	23,439[illegible]

APPENDIX I I.

IMPROVEMENT OF RIVERS AND HARBORS IN THE DULUTH, MINNESOTA, DISTRICT.

REPORT OF LIEUT. COL. GRAHAM D. FITCH, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Harbor at Grand Marais, Minnesota.
2. Harbor at Agate Bay, Minnesota.
3. Harbor at Duluth, Minnesota, and Superior, Wisconsin.
4. Harbor at Port Wing, Wisconsin.
5. Harbor at Ashland, Wisconsin.
6. Harbor at Ontonagon, Michigan.
7. Keweenaw Waterway, Michigan.
8. Harbor at Marquette, Michigan.
9. Harbor of refuge, Marquette Bay, Michigan.
10. Harbor of refuge at Grand Marais, Michigan.
11. Removing sunken vessels or craft obstructing or endangering navigation.

United States Engineer Office,
Duluth, Minn., July 15, 1910.

Sir: In compliance with General Orders, No. 7, War Department, Office of the Chief of Engineers, Washington, May 23, 1910, I have the honor to transmit herewith my annual report of the works under my charge in the Duluth, Minn., district for the fiscal year ending June 30, 1910.

Very respectfully,

Graham D. Fitch,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, U. S. Army.

II 1.

IMPROVEMENT OF HARBOR AT GRAND MARAIS, MINNESOTA.

The object of the improvement is to provide a harbor for purposes of refuge and for commerce.

For a description of the harbor and of improvements accomplished, see reports of the Chief of Engineers, United States Army, for previous years.

The only work done at this harbor by the United States during the last fiscal year was the replacing of a few missing deck planks, at a very small cost.

An examination made September 29, 1909, showed the breakwater piers to be in a fair state of preservation. Some of the sheeting on the east pier for protection from ice was gone in places, and two planks on the sloping deck of the west pier were broken. These failures are not of a serious nature. The deck over the easterly portion of the east pier is most in need of renewal, but as this is somewhat protected from the sea by rocks east and south of the pier and is not really in bad condition, there is no urgent necessity for repairs at the present time.

No deterioration has taken place in the government improvements at this harbor except the usual decay of timber in the pier superstructure, slight damage to facing timbers from ice, occasional damage to parts of the breakwaters from storms and from blows of vessels, and some filling in at the edge of the dredged basin by the movement of gravel during a certain severe storm. Repairs to breakwaters have been made as required. No redredging has as yet been found necessary.

The commerce is not large, but is increasing. As a harbor of refuge Grand Marais fills a useful place in the 125-mile stretch of rugged coast between Agate Bay and the international boundary. Its importance in this respect probably equals that of providing for the local commerce. Additional improvements desirable are stated in reports printed in House Document No. 939, Sixtieth Congress, first session.

APPROPRIATIONS.

March 1, 1879	$10,000	August 18, 1894	$3,000
June 14, 1880	10,000	June 3, 1896	3,000
March 3, 1881	20,000	March 3, 1899	30,000
August 2, 1882	20,000	June 13, 1902	2,000
July 5, 1884	10,000	March 3, 1905	2,000
August 5, 1886	10,000	March 2, 1907	5,000
August 11, 1888	15,000	June 25, 1910	2,000
September 19, 1890	22,350		
July 13, 1892	10,000	Total	174,350

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Grand Marais, Minn., for the calendar year 1909.

Season of navigation.—Opened April 17; closed December 22.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered steamers [a]	1,270	1,270	397,510	6,000

[a] No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor were registered. Number of rafts not known. Number of feet b. m. of logs is stated in footnote under table of freight traffic.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
Meats	285	Railroad ties (35,000)	1,925
Flour and mill stuff	2,000	General merchandise	3,000
Grain	650	Fish	350
General merchandise	5,000		
Live stock (150 head)	75	Total	5,275
Total	8,010		

In addition to the above, 2,000,000 feet of logs, valued at $28,000, were towed out of the harbor.

Total receipts and shipments, 13,285 tons. Decrease, 27,840 tons, equal to 68 per cent.

Total valuation, $1,656,557. Increase, $402,983, equal to 32 per cent.

Average haul, 809 miles. Rate per ton-mile, 0.78 mill.

The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

I I 2.

IMPROVEMENT OF HARBOR AT AGATE BAY, MINNESOTA.

For a detailed description of this harbor see earlier reports of the Chief of Engineers, United States Army.

Work done during the fiscal year consisted of repairs to the west breakwater as follows:

Damage caused by schooner *John Fritz* striking the pier August 24, 1909, when a tug was towing the schooner past the outer end of the pier and close to it while running to the south side of ore dock No. 6. The accident was due to a squall of wind and not a result of carelessness or negligence, and the vessel owner accordingly not held responsible.

The superstructure was broken and displaced at the outer 50 feet of its length down to a few feet below water. Repairs were made in the fall of 1909 by the United States by the method of hired labor and purchase of materials, at a cost of $993.05.

Repairs were made to the west breakwater in the spring of 1910 where damage had been caused by ice. The outer wall of the timber pier had been worn away at the water's edge for a length of 550 feet from the east end of the pier, probably by new thin ice moved by currents in the lake, until the timber was cut entirely through in places and partly through elsewhere. No other instance has been noted in this district where so deep wearing was caused by the ice.

The repairs to this damage were made by first filling out the depressions with pieces of timber, this requiring considerable trimming of the old timbers for taking in the filling pieces. Then the portion damaged was covered with steel plate, ⅜-inch thick, in pieces 3 feet wide in vertical dimension and 8 feet long, placed close and secured with lag screws. This work was done by hired labor and purchase of materials under public notice. The cost of these repairs was $2,091.01. The cost was greater on account of the accidental loss of a quantity of material. Some steel plates, tools, and fastenings designed for this work were lost April 12, 1910, while being transported on a scow from Duluth to Agate Bay, by the scow springing a leak and filling with water. Loss about $400.

No deterioration has taken place in connection with the government works at this harbor aside from natural decay of timber in superstructure, wear of ice, and damage from collision by vessels.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $2,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

August 5, 1886	$22,500.00	March 3, 1905	$2,000.00
August 11, 1888	15,000.00	March 3, 1905 (allotment)	500.00
September 19, 1890	25,000.00	March 2, 1907	4,000.00
July 13, 1892	30,000.00	June 25, 1910	2,000.00
August 18, 1894	30,000.00	Miscellaneous	4,078.69
June 3, 1896	50,000.00		
March 3, 1899	71,708.00	Total	258,786.69
June 13, 1902	2,000.00		

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Agate Bay, Minn., for the calendar year 1909.

Season of navigation.—Opened, April 17; closed, December 22.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	2,572	30	2,602	7,838,286	[a] 15,733
Sailing [b]	604		604	2,275,872	
Total	3,176	30	3,206	10,114,158	15,733

[a] Principally excursionists.
[b] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Increase in number of vessels over 1908, 1,172. Increase in registered tonnage, 2,450,154.

Passengers arriving, 8,128; departing, 7,605; total, 15,733.

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
Coal, soft	291,696	Iron ore	10,282,867
		Lumber (29,415,000 feet)	44,123
		General merchandise	45
Total	291,696	Total	10,337,035

Total receipts and shipments, 10,628,731. Increase, 3,940,129, equal to 59 per cent.

Total valuation, $29,308,378. Increase, $12,366,754, equal to 73 per cent.

Average cargo of iron ore in 1909, 6,821 gross tons.

Average cargo of iron ore in 1908, 6,988 gross tons.

Decrease in 1909, 167 tons per load, equal to 2.4 per cent.

Average haul, 809 miles. Rate per ton-mile, 0.78 mills.

The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce on Lake Superior and for each commodity.

I I 3.

IMPROVEMENT OF HARBOR AT DULUTH, MINNESOTA, AND SUPERIOR, WISCONSIN.

For the history of this harbor and the government improvements see previous reports of the Chief of Engineers, United States Army. A detailed description of the channels and other improvements as they were at the close of the season of 1909 is given in Bulletin No. 19, issued April, 1910, from the office of the survey of the Northern and Northwestern Lakes, pages 46 to 55. For a general history of the harbor from the beginning of its improvement by government and municipal authorities and with special reference to the extended litigation between the State of Wisconsin and the city of Duluth arising from the construction of the Duluth ship canal, reference may be made to History of Duluth Harbor, by Judge J. D. Ensign, of Duluth, published in 1900.

Following is an account of the government operations, for improvement and maintenance, during the fiscal year ending June 30, 1910.

Extension of Duluth Harbor Basin.—For the authorization of this work, its commencement, and results accomplished up to June 30, 1909, see Annual Report for 1909, Appendix I I, page 1903. The first contract under this part of the project was prosecuted energetically and completed October 18, 1909, which was nine and one-half months ahead of the date of completion allowed under the contract (July 30, 1910). The amount dredged in the fiscal year ending June 30, 1910, was 157,905 yards, at price of 10½ cents, making $16,580.02.

The total amount of work under this contract, which was begun July 8, 1908, and completed October 18, 1909, was 1,874,472 yards, at 10½ cents, making a contract cost of $196,919.56.

The depth of the dredged area is more than 20 feet at low water and generally from 22 to 24 feet. Dredging below 24 feet was not paid for. This overdepth was carefully determined by soundings taken through the ice in each winter following the season's work, and amounted to 86,040 yards for the entire contract, and is about 5 per cent of the amount paid for. This overdepth will be of benefit in providing pockets in which natural deposits will accumulate and into which material washed by vessels' propellers from the higher portions of the bottom will drop into and lodge, thus tending to maintain the requisite depth in the future.

The area dredged by this contract is 70 acres. Adding to this the portion of Rices Point channel, which by reason of this extension becomes part of the basin, gives an actual increase in the size of the basin of 78 acres, and adding this to the previous area of the basin, which was 171 acres, gives for the present area of the basin 249 acres.

Dredging for the removal of shoals.—The contract for dredging shoals, which was commenced June 22, 1909, by the Duluth-Superior Dredging Company, and was in progress at the date of the last annual report, was completed July 23, 1909, more than three months ahead of the date of completion allowed in the contract. The amount dredged in July, 1909, was 110,171 yards, at price of 13½ cents, or $14,873.09. This work was mainly in the Rices Point channel where the sand had washed in from the sides under the action of propeller wheels. These shoals were not such as to stop vessels, but were a little less than the regulation depth of 20 feet. The total amount of this contract, executed between the dates of June 22 and July 23, 1909, was 154,075 yards, which, at 13½ cents, made a contract cost of $20,800.13. This is also the amount of work on the removal of shoals for the season of 1909. Some of the work was in the St. Louis Bay channels below the Cross channel and some in the West Gate Basin.

Bids were opened April 25, 1910, for further dredging of shoals which had been shown by soundings taken through the ice last winter, the work to be done in the north and south channels of St. Louis Bay above or to the west of the Cross channel. No dredging had been done in these channels for more than eight years, and there was found considerable areas with slightly less than the required depth of 20 feet at low water, although no grounding of vessels have occurred. Award of contract was made to the Duluth-Superior Dredging Company, the lowest bidders, at the price of 12½ cents per yard, scow measurement. Material mostly mud, and to be towed into Lake Superior. The price is reasonable for this work. Work under this contract began May 16, 1910. The amount accomplished up to June 30, 1910, was 75,796 yards, which, at 12½ cents, made a contract cost of $9,474.51. The amount to be expended on this contract is about $20,000, and it is to be completed by October 31, 1910. Dredging is to a minimum depth of 22 feet at low water, and payment will not be made for more than 2 feet overdepth; that is, for more than a depth of 24 feet.

The amount of dredging for removal of shoals during the fiscal year was 185,967 yards, at a contract cost of $24,347.60.

Private dredging for wharf filling.—The construction of wharves in this harbor, and of coal wharves in particular, has been very active in recent years and continues so at the present time. This requires a large amount of sand filling, such as is found at the East Gate Basin and the Duluth Harbor Basin, and in general over the entire northern portion of Superior Bay. When government dredging is in progress in this locality much of the material is placed in wharves by the contractors. At other times sand is "borrowed" for this purpose; that is, excavated under permit from the Secretary of War and under the supervision of this office and without expense to the United States. During the fiscal year there was thus borrowed the very considerable amount of 928,462 yards of sand, nearly 1,000,000 yards. Of this amount 863,999 yards were taken from the East Gate Basin, in regular dredge cuts from the east bank, the excavation being deep and leaving not less than 20 feet of water, and the resulting enlargement being such as to facilitate the passage of vessels through the Duluth-Superior bridge, and this excavation thus being made to serve as an aid to navigation. For previous enlargement of the East Gate Basin in a similar manner see Annual Report for 1909, Appendix I I, page 1902.

Sand was also borrowed from the Duluth Harbor Basin during the fiscal year to the extent of 64,463 yards. This was taken from the south edge of the basin, and will contribute toward its enlargement to that extent without cost to the Government. As an offset to this it may here be stated that in former years a considerable amount of dredged material was dumped by contractors inside the Minnesota Point harbor line, without objection by the riparian owners, when too rough weather for towing into the lake, and now much of this material has to be redredged by the Government in its enlargement of the harbor basin, by reason of setting the harbor line 750 feet in toward shore, as was done in 1908, and the extension of the basin in that direction.

Improvement of Superior entry, Wisconsin.—The operations during the fiscal year ending June 30, 1910, are outlined in the following detailed statement prepared by the assistant engineer in charge of the work:

The work of improvement of this entrance has been continued in accordance with the project approved by the Secretary of War April 5, 1907.

For an outline of this project, see the Annual Report of the Chief of Engineers for 1907, Appendix J J, pages 1833–1835. The progress of this improvement at the close of the fiscal year ending June 30, 1909, is given in the Annual Report of the Chief of Engineers for 1909, Appendix I I, pages 1904–1908, with an inset sheet showing device for cutting off piles below water to an even grade.

North concrete revetment.—The north concrete revetment was completed, with the exception of the removal of part of the accessory trestle, in July, 1909, with the building in place of 27 of the monolithic blocks of the superstructure. These blocks contain 807.48 cubic yards of concrete and required 1,030.75 barrels of Portland cement for their construction.

The accessory trestles for carrying the concrete plant used in the construction of this revetment have been removed for a distance of 1,200 feet from the outer end and the piles and timber secured.

Sinking in place the cribs of the north and south breakwater heads.—The trench for the south breakwater head was excavated with the United States 15-inch hydraulic pump.

A total of 1,890 piles was driven for the foundations for the breakwater heads and 2,035 piles cut off to even grade at from 26.2 feet to 34.1 feet below low-water datum.

The piles as driven project from 2 to 3 feet above the bottom of the lake and the spaces between these piles were filled in for the entire 900 feet length of the two breakwater heads with stone taken from the old timber and stone piers with United States plant.

The work of sinking the eight large steel-plated timber cribs, which constitute the substructure of the outer 450 feet of each of the rubble-mound breakwaters, was commenced on August 16, 1909, with the placing of crib No. 5 of the north breakwater and completed on November 8, 1909, with the placing of crib No. 4 of the south breakwater.

The entire work was performed with United States plant and hired labor, with the exception of the crib filling of gravel, which was furnished and placed under a contract with Whitney Brothers Company, of Superior, Wis.

After the cribs were in place 9,272.72 tons of riprap was placed around the base of the cribs under contracts with the Great Lakes Dredge and Dock Company.

The following is a detailed statement of the work and materials involved in crib sinking and the cost of the same:

Detailed statement of the work.

Gravel filling: Contract with Whitney Brothers Company for delivering gravel for the eight cribs, 20,902.4 cubic yards, at $1.15 per cubic yard			$24,037.76
Bearing piles: Contract with Mr. J. H. Younker for delivering piles for foundation of cribs and for pile clusters, 134,796 linear feet piling, at $0.135 per linear foot			18,197.46
Riprap for cribs: Contract with Great Lakes Dredge and Dock Company for delivering 9,272.72 tons of riprap, at $1.25 per ton			11,590.90
Timber for deck: To 180,384 feet b. m. fir timber, at $23.10			4,166.87
Deck spikes and bolts:			
To 16,500 pounds drifts, at $2.08 per 100		$343.20	
To 17,500 pounds spikes, at $2.23 per 100		390.25	
			733.45
Concrete in pierheads:			
To 507.5 barrels cement, at $1.77		$898.28	
To 357.2 yards pebbles, at $1.085		387.56	
			1,285.84
Total expense for hardware, $4,824.96—75 per cent			3,618.72
Supplies directly chargeable to cribs:			
Plant		$1,259.58	
Miscellaneous		160.63	
			1,420.21
Miscellaneous:			
Labor account	$5,969.70		
Expenses, coal, lumber, etc	2,888.26		
	8,857.96—75 per cent		6,643.47
Labor on plant directly chargeable to crib sinking			15,848.16
Accessory plant, tug and pump hire			505.00
United States tug expenses from December 1, 1908, to December 31, 1909, 13 months, $9,912.68—50 per cent			4,956.34
Expense of diver			2,107.50
Total costs, depreciation of plant			4,745.98

Scow No.	Hull.	Machinery.	Hose.
4	$2,100.00	$1,998.56	$83.70
5	3,000.00	7,982.00	
6	6,123.71	6,235.77	
7	7,000.00	3,825.20	193.00
9	1,900.00	1,084.00	
Launch	400.00		
	20,523.71	21,125.53	276.70

15 per cent of $20,523.71	$3,078.56
7.5 per cent of $21,125.53	1,584.41
30 per cent of $276.70	83.01
	4,745.98

Launch *Chord:* Cost of labor and supplies, $769—70 per cent		$538.30
Administration and inspection, from March 1 to December 31, 1909, 10 months:		
Relative weights of construction work done—		
Rubble mound, $87,000	4=4/14	
North revetment, $30,000	3=3/14	
Crib sinking, $98,000	7=7/14=1/2	
	14	
1 assistant engineer, ½ of 10 months, at $250	$1,250.00	
1 junior engineer, ½ of 10 months, at $175	875.00	
1 junior engineer, ½ of 4 months, at $150	300.00	
1 overseer, ½ of 8 months, at $140	560.00	
1 inspector, ½ of 8 months, at $110	440.00	
1 inspector, ½ of 4 months, at $115	230.00	
1 inspector, ½ of 3 months, at $125	187.50	
Office force at Duluth for one month, $895; ten months $8,950—⅓	2,983.33	
Use of steamer *Vidette* 5 days, at $20 per day	100.00	
Miscellaneous expenses at Duluth, $314.70—⅓	104.90	
Blueprinting and soap at Duluth	30.00	
		7,060.73
Expenses of watchmen at Superior Entry for 10 months, $2,311.25—½		1,155.62
		108,612.31
Credit by cut-off piles sold		5,174.69
Total cost of placing cribs		103,437.62

The foregoing shows the total cost of sinking the 8 breakwater head cribs, but the total amount expended for this work in the fiscal year ending June 30, 1910, was $102,195.17, and deducting from this amount $5,174.69 for cut-off piles sold, would give $97,020.48 chargeable to sinking cribs for that year.

General statement—Proportional percentage of expense.

Item.	Cost.	Per cent.
Gravel	$24,037.76	23.24
Piles, credited with cut-offs	13,022.77	12.59
Riprap	11,590.90	11.21
Decking	4,166.87	4.03
Drift bolts and boat spikes	733.45	.72
Concrete in pier heads	1,285.84	1.24
General hardware	3,618.72	3.51
General supplies	1,420.21	1.37
Miscellaneous	6,643.47	6.42
Labor	15,848.16	15.32
Accessory plant	505.00	.48
Expense of United States tug Essayons	4,956.34	4.79
Expense of diver	2,107.50	2.04
Depreciation of plant	4,745.98	4.59
Expense launch Chord	538.30	.52
Administration and inspection	7,060.73	6.82
Watchmen	1,155.62	1.11
	103,437.62	100.00

Concrete footing blocks for breakwater heads.—A total of 92 footing blocks containing 502.6 cubic yards of concrete and requiring 723.5 barrels of cement were completed, making, with the 294 blocks completed during the fiscal years of 1908 and 1909, 386 blocks, the number required for the two breakwater heads.

Building the concrete superstructure to breakwater heads.—This work was commenced on April 1, 1910, with setting in place on the cribs the 10-ton concrete footing blocks, over which the large monolithic concrete blocks are built in place. A total of 386 of these blocks was set in place, completing this part of the work on the north and south breakwater heads.

The work of building in place the monolithic concrete blocks, which are superimposed on the footing blocks to form the superstructure of the breakwater heads, was commenced on April 19, 1910, and the north breakwater head superstructure was completed on June 1, 1910. The same work was commenced on the south breakwater head on June 6, 1910, and 29 monolithic blocks had been completed on June 30. Only 7 blocks, containing 690 cubic yards, remain to be built to complete this superstructure. The total volume of the concrete in the two breakwater heads, as completed June 30, 1910, is 9,096 cubic yards. Work was commenced on the shore end of the north breakwater revetment on May 16, 1910, and at the close of the fiscal year that part of the substructure in water, composed of piles, sheet piling, and timber wales, was practically complete.

A total of 9 concrete molds, consisting of 28 pieces, was built for the concrete superstructure to breakwater heads, and 18 end pieces and 24 side pieces of the molds for the concrete superstructure to the shore end revetments of the breakwaters. In both cases the molds were constructed mainly from the old concrete molds used in the construction of the north and south concrete canal revetments.

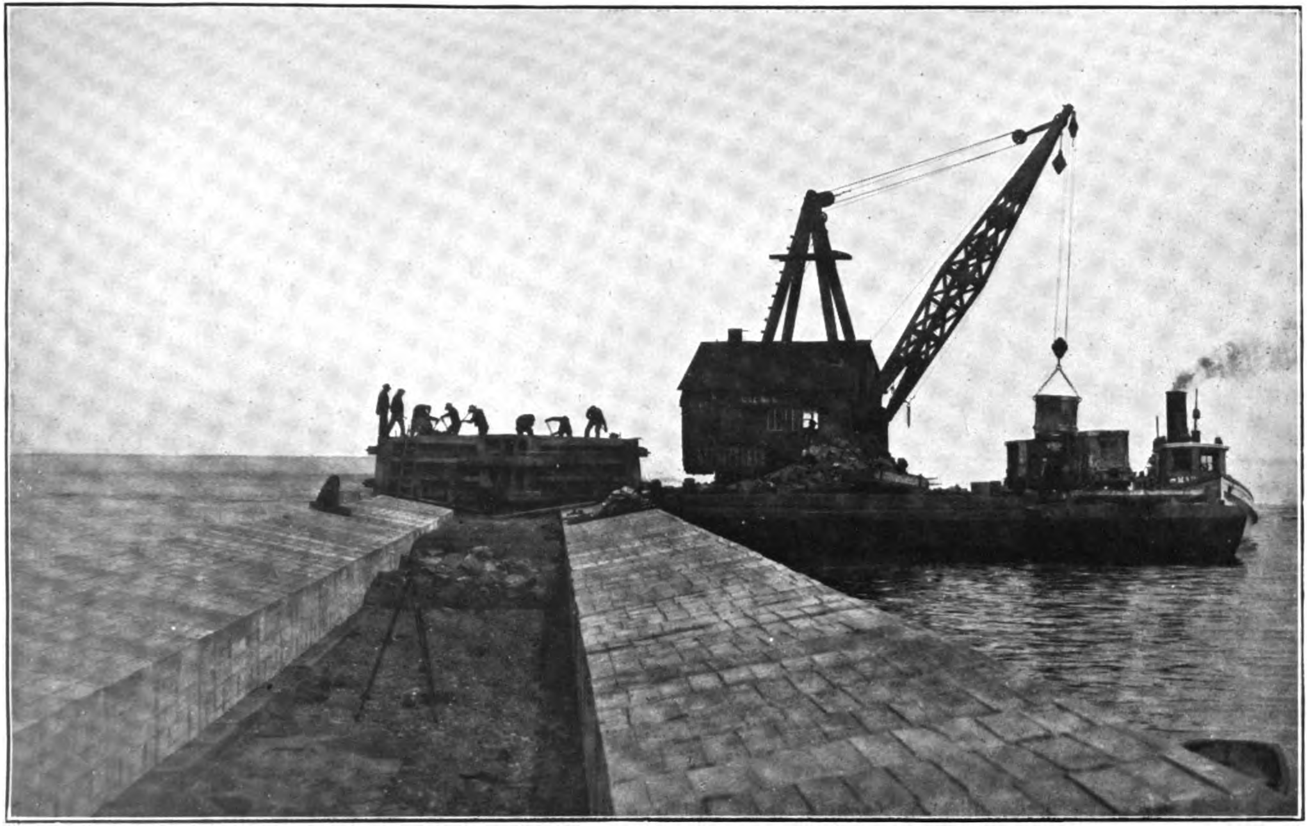
North Rubble Mound breakwater.—Work on this breakwater was continued under the contract with the Great Lakes Dredge and Dock Company until November 30, 1909. A total of 31,954.67 tons of stone was placed during the fiscal year under this contract, which provided for the expenditure of $193,250. Another contract was made with the same company in June, 1910, which provides for the expenditure of about $15,000, and at the close of the fiscal year 817.3 tons of stone had been placed under this contract. The price paid for stone in place in the breakwater under both of these contracts was $1.60 per ton of 2,000 pounds.

A total of 840 linear feet of this rubble mound has been completed, which, with the 450 linear feet of breakwater head, also complete, forms already a very effective breakwater, and has very materially improved conditions at the Superior entrance during storms.

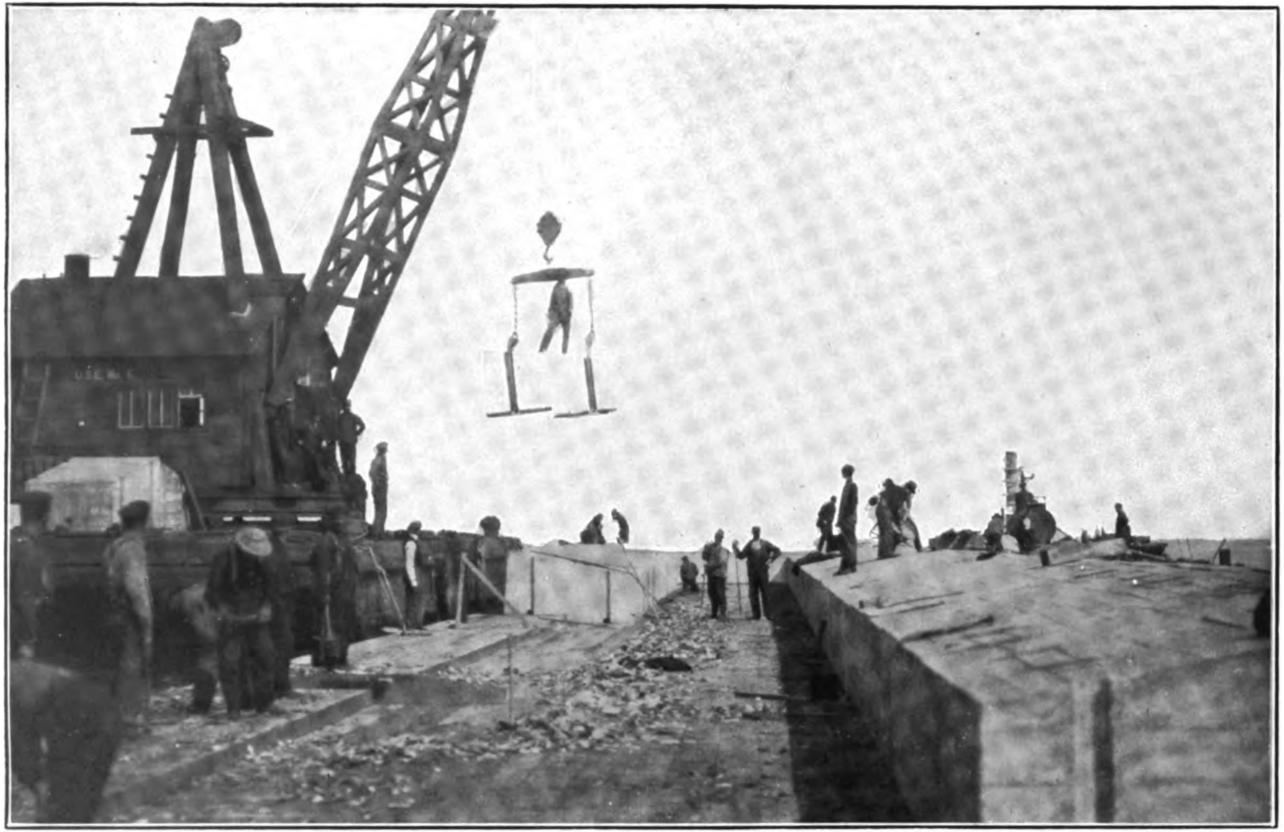
The stone used in this construction is a very dense gabbro, taken from the escarpment of Lake Superior. It has a specific gravity of 2.85 and weighs 178.15 pounds per cubic foot.

South Rubble Mound breakwater.—Work has been continued with United States plant and hired labor at such times as the plant could be spared for the purpose of removing the heavy riprap in the vicinity of the old canal piers and placing it in this breakwater.

This breakwater has been built up above the water level for a distance of 260 linear feet in water, with a depth of from 16 to 20 feet.



SUPERIOR ENTRY. FILLING A MOLD FOR THE MONOLITHIC CONCRETE BLOCKS ON SOUTH BREAKWATER HEAD, JUNE, 1910.



SUPERIOR ENTRY. SETTING CONCRETE FOOTING BLOCKS ON NORTH BREAKWATER HEAD, APRIL, 1910.

The breakwater head, composed of cribs and concrete superstructure, is practically complete.

United States 15-inch hydraulic dredge.—The United States 15-inch hydraulic dredge which has been used at Superior entry during the past four years is undergoing modification to accommodate a cutter head with its engines and machinery, and the scow was occordingly extended 28 feet in its length. A ladder for carrying the cutting device was built, two spuds with appropriate spud guides were built, and the scow generally repaired as to calking and cementing. A contract was entered into with the Ellicott Machine Company, of Baltimore, Md., for building the required machinery with the cutter head and all of its operating devices. The final delivery of this machinery was made on June 22, 1910, and the work of its installation will be completed at an early date.

All of the work connected with this installation has been performed with United States hired labor and plant, with the exception of building the machinery described above. For labor and material in connection with the extension and modification of the 15-inch dredge scow, building cutter ladder, spuds, spud guides, gallows frame, and A frame, the construction of 71 twelve-barrel pontons for carrying the 15-inch discharge pipe, and the construction of 340 linear feet of 15-inch steel pipe, a total of $8,201.81 has been expended.

Distribution of expenditures.—The following is a statement showing the distribution of money expended on the improvement of Superior entry, Wisconsin, during the fiscal year ending June 30, 1910:

Administration		$17,759.97
Contracts:		
Piling	$16,680.64	
Rubble mound	82,763.78	
Stone	11,590.90	
Gravel	24,037.76	
		135,073.08
Labor on new work	45,750.50	
Labor, repair, and care of plant	6,535.79	
		52,286.29
Miscellaneous materials and articles		24,880.66
Total expended for fiscal year		230,000.00

The relation of the cost of the foregoing items to the total expenditures would be as follows:

	Per cent.
Administration	7.72
Contracts	58.73
Labor	22.73
Miscellaneous	10.82

NOTE.—On account of piles sold during the fiscal year $8,304.03 was received and credited to the appropriation.

Surveys of channels and basins.—Extensive soundings were taken through the ice during the past winter, between the dates of December 20 and March 19, covering the following channels: St. Louis River from Grassy Point to the blast furnace, including the main channel, the blast furnace slip, and the old channel lying between the main channel and shore; North and South channels, St. Louis Bay; portions of the West Gate Basin and East Gate Basin; Superior Front channel south of the Hanna coal dock; northerly portion of the Superior Harbor Basin; portions of Rices Point channel and

Duluth Harbor Basin, which had been dredged the previous season; Duluth Canal and Superior Entry; and dumping grounds in the lake at Duluth and Superior. Soundings were usually taken 10 feet apart, on cross lines which were 50 or 100 feet apart. The total number of soundings was 65,891. An ice-boring machine was used, described in former reports. No serious shoaling was found at any point. In the St. Louis Bay channels west of the Cross channel some areas had a depth less than 20 feet. The shoaling had not reached a point as to be struck by vessels, but had nearly reached the limit, and these channels are being redredged this year, as noted elsewhere. No dredging had been done in these channels since they were completed eight years ago. In the Superior Front channel, which had not been dredged for the last eight years, there was the full depth of 20 feet, and no dredging necessary. At the Superior Harbor Basin, near the mouth of the Nemadji River, where shoaling has heretofore been the worst of any place in the harbor, there has been some filling, but still a depth of more than 20 feet. This was dredged three years ago and the digging was deep, so as to provide a good margin against shoaling, as noted in the Annual Report of 1908, Appendix J J, page 1897. The Duluth Canal is holding its depth between the piers and deepening some in places. In the lake approach to this canal, which was deepened in 1907 to 30 or 32 feet, there is still a depth of more than 30 feet along the axis, and a width of 240 feet with a depth of 30 feet, while at the sides there has been a slight shoaling by the sand running in, which has reduced the depth to about 28 feet. This shoaling is not such as to require dredging this season. At the Superior Entry the lake approach was also deepened to 30 feet or more in 1907. It now shows some shoaling at the sides, similar to the Duluth Canal approach, but still has a depth of 30 feet in the middle portion.

The cost of the foregoing surveys, in labor and other field expenses, was $2,442.26.

Harbor patrol.—A systematic supervision of the harbor has been in operation since August 22, 1906, by Mr. H. C. Bellinger, harbor inspector. The duties of the inspector are to enforce the rules and regulations pertaining to the harbor, with special reference to injurious deposits, encroachments by wharf construction, speed of vessels, obstruction of channels by rafts, assignment of position to vessels in the anchorage basin, etc., and the securing of evidence in case of violations. The U. S. steam launch *Tangent* is used for this purpose. This launch is 42 feet long, has a small cabin, without accommodations, and is not just what is needed, but is economical in expense and can be used for the present. The crew numbers only two, a pilot and a steam engineer. Effective work is accomplished by this inspection.

Commerce.—The system of vessel reports which was inaugurated in 1895 has been kept up, and the commercial statistics accompany this report. These are as accurate as is practically possible to make them, being compiled from the individual reports of each trip of every vessel, in or out, made directly to this office.

These data are considered of much value by the public, as evidenced by the great demand upon this office for copies from railroad corporations, vessel agencies, commercial organizations, publishers of trade and technical journals, and others, a demand which is increasing yearly. The reports are mimeographed in this office for gratuitous distribution.

Rules and regulations—Revision affecting bridges.—Under approval of the Secretary of War, dated May 12, 1910, pargaraphs 7, 12, and 14 of the rules and regulations for the canals and channels at this harbor were amended to read as follows:

> 7. Following is the number and kind of blasts of the steam whistle, or of a horn when a vessel is not navigated by steam power, which shall be given as a signal for opening the respective bridges:
>
> Interstate (or Duluth-Superior) bridge, 1 long, 1 short, 1 long.
> Minnesota draw, N. P. bridge, 1 long, 2 short.
> Wisconsin draw, N. P. bridge, 2 long, 2 short.
> Grassy Point bridge, 2 short, 1 long.
> Lamborn avenue bridge, 3 short blasts.
> Transfer bridge, New Duluth, 3 long blasts.
>
> The duration of a long whistle should not exceed 3 seconds, and a short whistle should not exceed 1 second.
>
> 12. Upon receiving a signal for opening the draw the tender shall at once answer with a return signal, which shall be the same as the signal for opening, to indicate that the vessel signal has been heard. The tender shall take note of the vessel's position, speed, etc., and open the bridge in time to allow the vessel to pass through (see, however, par. 13).
>
> 14. Vessels must be given precedence over highway or railway traffic. When a signal is given by a vessel to open the bridge, a railroad train, a street car, or wagon that may be approaching to cross the bridge must be required to wait for the vessel to pass. Provided, however, that vessels of 100 net registered tons or under may be held for a short period in case a first-class passenger train carrying United States mails is ready to cross the bridge, or in case four street cars coming in one direction are ready to cross the bridge.

Regulation of dumpings.—The following regulation was prescribed by the Assistant Secretary of War under date of December 3, 1909:

> All dredgings, earth, garbage, and other refuse material of every description, taken from Duluth-Superior Harbor into Lake Superior to be dumped, shall be deposited at such points as shall be designated and marked by the district engineer officer, at a distance not less than 1 mile nor more than 2 miles from the lake entrance of the Duluth ship canal, and at the same distance from the outer entrance to the Superior Entry, provided that no material shall be deposited where the depth of water is less than 45 feet at the time of dumping.

Harbor capacity.—The following information relating to the capacity of this harbor, here given for the first time, will be found of interest. It is extracted from a memorandum prepared by J. H. Darling, principal assistant engineer:

TABLE A.—*Capacity or area of protected harbor space in Duluth-Superior Harbor.*

Parts of harbor.	Entire harbor area.		Area outside harbor lines available for channels and basins.		Area inside harbor lines available for wharves and slips.	
	Acres.	Square miles.	Acres.	Square miles.	Acres.	Square miles.
Superior Bay	4,125.0	6.44	2,096.0	3.27	2,029.0	3.17
Allouez Bay	1,110.9	1.73	222.9	.34	888.0	1.39
St. Louis Bay	2,971.9	4.64	1,028.6	1.60	1,943.3	3.04
Upper Bay, from Grassy Point to head of Spirit Lake	7,907.0	12.36	5,643.0	8.82	2,264.0	3.54
Total	16,114.8	25.17	8,990.5	14.03	7,124.3	11.14

TABLE B.—*Wharfage area within harbor lines.*

DIVISION 1.—LOCALITIES ACCESSIBLE TO RAILWAYS WITHOUT BRIDGING CHANNELS.

1 Locality.	2 Total area within harbor lines.	3 Area between slips.	4 Area of existing wharves.	5 Available areas for additional wharves.
DULUTH.	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Superior Bay, from canal to Duluth-Superior bridge	509.1	389	206	183
St. Louis Bay, from Rices Point to Grassy Point	1,071.0	822	940	728
Grassy Point to Spirit Lake	773.6	594	5	589
Spirit Lake (to end of harbor line)	377.4	290	....	290
Total	2,731.1	2,095	305	1,790
SUPERIOR.				
Superior Bay, from Duluth-Superior bridge to Nemadji River	762.5	586	112	474
Allouez Bay:				
Wisconsin Point	213.7	164	....	164
Main shore	674.5	519	73	446
Howards Bay	279.7	215	66	149
St. Louis Bay, from Howards Bay to Grassy Point	592.6	455	108	347
Above Grassy Point to end of harbor line	905.0	699	....	699
Total	3,428.0	2,638	359	2,279
Duluth-Superior (combined) areas expressed in acres	6,159.1	4,733	664	4,069
Areas expressed in square miles	9.62	7.39	1.04	6.35

DIVISION 2.—LOCALITIES AT PRESENT INACCESSIBLE TO RAILWAYS.

1 Locality.	2 Total area within harbor lines.	3 Area between slips.	4 Area of existing wharves.	5 Available areas for additional wharves.
Minnesota Point (Duluth)	757.3	583	....	583
Big Island (Superior)	208.1	160	....	160
Total	965.4	743	....	743
Total areas for divisions 1 and 2, wharfage area in acres	7,124.5	5,476	664	4,812
Wharfage area in square miles	11.13	8.55	1.04	7.52

EXPLANATORY NOTES.—Column 2 gives the area between established harbor lines and shore line. This includes artificial fills from hydraulic deposits, sawmill refuse, etc., and marsh areas capable of being dredged for slips. The harbor line is a pierhead and bulkhead line, marking the limit of both open-pile constructions and solid-filled wharves.

Column 3 gives areas available for wharf construction, exclusive of slips of usual dimensions and spacing. These areas in practice vary in width in accordance with the character of the business. Coal docks are from 300 to 1,200 feet wide, and some of the newer ones work entirely from the harbor-line front and require no slips. Iron-ore docks are narrow, about 50 to 60 feet wide. Merchandise docks 300 feet wide, more or less. For purpose of this estimate a uniform width of 500 feet is assumed, and intermediate slips 150 feet wide, dredged in a direction perpendicular to the harbor line.

The results of these estimates may be summarized as follows:

1. Taking only those portions of the harbor front which are accessible to railway tracks, or which may be reached by spur tracks without bridging channels, there is within the harbor lines—that is, between the harbor line and shore—a total area of 6,159 acres, or 9½ square miles. This includes the present wharves and slips, as well as unoccupied space available for additional wharves and slips.

2. Making a deduction from the above area for a certain space necessary for slips, it leaves 4,733 acres, or 7¼ square miles of space within the harbor lines available for actual wharves, which may be either earth filled or open construction.

3. Wharves now in operation or under construction have a total area of 664 acres, or about 1 square mile. This is one-seventh of the available space.

4. The unoccupied and available space for additional wharves, exclusive of necessary slips, is 4,069 acres, or 6¼ miles.

5. If we include the harbor front of Minnesota Point and Big Island, which are now inaccessible to railroads without bridging channels, the total wharfage areas in Duluth-Superior Harbor are as follows: 11 square miles of space within harbor lines; 8½ miles of wharfage space besides necessary slips; 1 square mile of wharves in operation or under construction; and 7½ square miles of unoccupied space available for additional wharves.

6. No other harbor on the Great Lakes will compare with this in point of capacity. The extensive terminal facilities here are on a scale with the large commerce transacted. It is stated in the Report of Commissioner of Corporations on Transportation by Water in the United States, Part II, page 13, that "Duluth-Superior is the most important port for shipments and has the largest water-borne traffic of any of the lake ports;" and again, page 200, speaking of the same harbor: "This is the most important port on the Great Lakes, and the freight tonnage is believed to be exceeded only by that of two other ports in the United States, New York and Philadelphia.

Large as is the commerce of Duluth-Superior Harbor, the available capacity of the harbor is as yet but slightly utilized, and it will readily be seen from the figures here presented that there is room for an almost unlimited increase in the business of this harbor without any crowding or congestion.

APPROPRIATIONS.

HARBOR AT DULUTH, MINN., AND SUPERIOR, WIS.

June 3, 1896	$50,000.00	June 13, 1902	$200,000.00
June 4, 1897 (sundry civil act)	437,500.00	March 3, 1905	270,000.00
July 1, 1898 (sundry civil act)	770,138.00	June 30, 1906 (sundry civil act)	100,000.00
March 3, 1899 (sundry civil act)	300,000.00	March 2, 1907	725,000.00
June 6, 1900 (sundry civil act)	793,187.50	March 4, 1907 (sundry civil act)	200,000.00
March 3, 1901 (sundry civil act)	320,000.00	March 3, 1909	470,000.00
June 28, 1902 (sundry civil act)	459,727.50	June 25, 1910	500,000.00
		Miscellaneous receipts	10,971.53
		Total	5,606,524.53

The following statement shows the manner in which the appropriations have been expended since June 30, 1896. The amount expended under the different classes of work includes the cost of soundings, superintendence, buoying, and contingencies:

Dredging and maintenance	$2,628,998.85
Duluth Canal piers	650,000.00
Wisconsin Entry	1,276,179.84
Purchase of land	107,061.19
Vessel-yard construction	17,750.00
Engineer building	25,000.00
Total	4,704,989.88

HARBOR AT DULUTH, MINN.

(See p. 281, H. Doc. No. 421, 57th Cong., 2d sess., $852,299.20.)

The following statement shows the manner in which the appropriations have been expended. The amount expended under the different classes of work includes the cost of soundings, superintendence, buoying, and contingencies:

Total amount expended to June 30, 1897:	
Breakwater	$110,000.00
Dredging	644,638.55
Canal piers, etc	97,660.65
Total	852,299.20
Expended prior to present project:	
Breakwater	110,000.00
Canal piers, etc	45,698.33
Dredging	122,354.05
Total	278,052.38
Expended under the project adopted in 1881:	
Canal piers, etc	51,962.32
Dredging	522,284.50
Total	574,246.82

HARBOR AT SUPERIOR BAY AND ST. LOUIS BAY, WISCONSIN.

March 2, 1867	$63,000.00	March 3, 1881	$10,000.00
April 10, 1869	45,000.00	August 2, 1882	40,000.00
July 7, 1870	40,000.00	July 5, 1884	45,000.00
March 3, 1871	60,000.00	August 5, 1886	22,500.00
June 10, 1872	50,000.00	August 11, 1888	50,000.00
March 3, 1873 (allotted)	63,950.80	September 19, 1890	65,000.00
Allotted from appropriations for "Repairs of harbors on northern lakes"	5,433.00	July 13, 1892	70,000.00
August 14, 1876	3,000.00	August 18, 1894	50,000.00
June 18, 1878	3,000.00	Total	695,883.80
March 3, 1879	5,000.00	Aggregate	7,154,707.53
June 14, 1880	5,000.00		

EXPENDITURES.

Amount expended under original project, adopted in 1867	$258,000.00
Amount expended under project recommended by Board of Engineers in 1873	77,513.26
Amount expended under present project to June 30, 1897	360,370.54
Total	695,883.80

The following statement shows the manner in which the appropriations have been expended. The amount expended under the different classes of work includes the cost of examinations, soundings, superintendence, buoying, and contingencies:

Repairs and beach protection	$13,233.00
Construction and repair to piers	334,278.64
Dredging	348,372.16
Total	695,883.80

ABSTRACT OF CONTRACTS IN FORCE.

Contract was entered into with Great Lakes Dredge and Dock Company, of Chicago, Ill., dated August 31, 1907, approved by Chief of Engineers September 10, 1907, for building north rubble mound breakwater at Superior entry, Wisconsin. Amount of contract, $193,250, including contingencies, inspection, etc. Price, $1.60 per ton for stone placed in the work. Operations to commence by September 27, 1907. Contract completed November 29, 1909.

Contract entered into with John H. Younker, of Ashland, Wis., dated March 2, 1909, approved by Chief of Engineers March 27, 1909, for furnishing 135,000 linear feet of piling in the water at Superior entry, Wisconsin, at 13½ cents per linear foot. Work commenced within ten days after March 31, 1909, and completed September 2, 1909, the time limit for completion having been waived for a reasonable period by authority of Chief of Engineers, June 2, 1909.

Emergency contract was entered into June 22, 1909, with Duluth-Superior Dredging Company, of Duluth, Minn., for dredging about $20,000 worth of shoals in Duluth-Superior Harbor at 13½ cents per cubic yard. Work commenced at once, and was completed July 23, 1909.

Contract was entered into July 14, 1908, with the Great Lakes Dredge and Dock Company, of Chicago, Ill., for dredging in Duluth Harbor Basin to the extent of about $180,000, at 10½ cents per cubic yard. Contract approved by Chief of Engineers July 23, 1908. Work commenced within ten days after July 27, 1908, and was completed October 18, 1909.

Contract was entered into July 31, 1909, with Whitney Brothers Company, of Superior, Wis., for about $26,000 worth of gravel for crib filling, at $1.15 per cubic yard delivered in place. Contract approved by Chief of Engineers August 16, 1909. Work began immediately, and was completed November 10, 1909.

Emergency contract was entered into August 27, 1909, with Great Lakes Dredge and Dock Company, of Chicago, Ill., for riprap for cribs, amounting to about $5.500, at $1.25 per short ton in place. Work began August 28, 1909, and was completed October 6, 1909.

Emergency contract was entered into October 4, 1909, with Great Lakes Dredge and Dock Company, of Chicago, Ill., for about $6,000 worth of riprap for cribs, at $1.25 per short ton in place. Work began October 4, 1909, and was completed December 3, 1909.

Emergency contract was entered into February 28, 1910, with Ellicott Machine Company, of Baltimore, Md., for furnishing and delivering dredging machinery at Itasca, Superior, Wis., for a total of $5,480. Work began immediately to be delivered by May 10, 1910.

Emergency contract was entered into March 22, 1910, with Whitney Brothers Company, Superior, Wis., for furnishing and delivering 4,000 cubic yards of gravel at Superior entry, Wisconsin. Work to begin by June 1, 1910, and to be completed by September 1, 1910. Price, $1 per cubic yard.

Contract with D. G. Cutler Company, Duluth, Minn., dated April 7, 1910, approved April 22, 1910, for furnishing and delivering at Superior entry, Wisconsin, 10,000 barrels Huron Portland cement, at $1.48 per barrel, with a rebate of 10 cents for each sack returned. Work to begin by May 6, 1910, and to be completed within ninety days.

Emergency contract dated April 28, 1910, with Duluth-Superior Dredging Company, of Duluth, Minn., for dredging shoals in St. Louis Bay, Duluth-Superior Harbor (about $20,000 worth), at 12½ cents per cubic yard. Work to begin May 15, 1910, and be completed October 31, 1910.

Contract dated June 6, 1910, approved June 16, 1910, with Great Lakes Dredge and Dock Company, of Chicago, Ill., for building part of rubble mound breakwater at Superior entry, Wisconsin (about $15,000 worth), at $1.60 per ton for filling, and the same price for 10-ton stone. Work to begin by July 3, 1910, and be completed December 15, 1910.

COMMERCE OF DULUTH-SUPERIOR HARBOR FOR CALENDAR YEAR 1909.

All tons in this report are of 2,000 pounds.

Total vessel freight received and shipped, 32,529,301 tons, valued at $261,509,159.

Increase in freight tonnage over 1890, 1,040 per cent.

Increase in freight tonnage during the past year, 36.69 per cent.

It is impossible to give precise figures of the marine commerce of the principal ports of the United States for comparison with Duluth-Superior Harbor, for the reason that at ocean ports of the United States as well as of foreign countries, no record of domestic tonnage is kept at the custom-houses, whereas on the Great Lakes a record is kept of the total marine commerce, both foreign and domestic. In the principal ocean ports of the United States the tonnage of the local and coastwise (domestic) marine commerce is several times greater than that of the foreign.

Any comparison, therefore, of the relative marine commerce of lake and ocean ports, based solely upon custom-house records is, for the reason stated, incorrect and misleading.

However, the custom-house records of the marine commerce of ports on the Great Lakes are very incomplete for the reason that no account is kept of the movement of freight or passage of vessels between subports of a district, and as, in the case of the Duluth and Superior customs districts on Lake Superior, numerous subports are included which do an important business with each other, none of which is required to be reported to the custom-houses, a large amount of the commerce of any particular port is unknown to the custom-houses. Furthermore, a vessel may enter or clear from the port or any subport of a district, report its cargo, and subsequently load or unload the whole or any part of its cargo at any other subport of the same district without further action at the custom-house.

The statistics of the marine commerce of this port are obtained as follows: The master or clerk of every vessel entering or departing from Duluth-Superior Harbor makes a report to this office covering the name of the vessel, the net registered tonnage of same, whether light or loaded, and, if loaded, what the cargo consists of, whether, in entering, the vessel is destined for Duluth or Superior, and whether, in departing, the vessel was loaded at Duluth or Superior, etc., all as provided by the act of Congress approved February 21, 1891. These reports, so far as the arrival and departure of vessels is concerned, are then checked against the lists of vessels arriving at and departing from the harbor, furnished by the watchmen employed by this office, and stationed at the entrances to the harbor, which lists have previously been entered in record books provided for that purpose. Should any vessel master fail to make his report a special request is made for it. The vessel reports are also checked against the iron-ore dock reports, the board of trade records of grain shipments, etc.

The navigation season for Duluth-Superior Harbor averages only about eight months per annum, while for ocean ports navigation is carried on during twelve months. Considering the mean monthly freight movement during the season of navigation, Duluth-Superior Harbor practically stands next to New York.

REMARKS ON THE COMMERCE OF DULUTH-SUPERIOR HARBOR FOR 1909.

Vessel tonnage.—Net registered tonnage is used, and is obtained from vessel reports made to this office, and checked by official marine directories.

Valuations.—Freight valuations were obtained from the various trade journals, commercial records, and the principal wholesale dealers, and are based on average wholesale prices on board vessels for exports, and landed on wharves for imports.

Hard coal shows an increase of 96,553 tons over 1908, with an increase in valuation amounting to $603,457.

Soft coal shows a decrease of 239,549 tons under 1908, with a decrease in valuation of $540,290.

Wheat and other grains show a decrease of 2,586,313 bushels under 1908, with a decrease in valuation of $1,010,897.

Iron ore shows an increase of 8,414,006 tons over 1908, with an increase in valuation amounting to $24,969,396.

Flour shows a decrease of 128,569 barrels under 1908, with an increase in valuation of $639,235.

General merchandise shows an increase of 3,174 tons and $587,190 over 1908.

Copper shows an increase of 20,474 tons and an increase of $4,537,127 over 1908.

Lumber shows an increase of 73,054,000 feet and an increase in valuation amounting to $1,875,118 over 1908.

Logs.—The receipt of logs by water has ceased to be a factor in the marine commerce of this port.

Oils show a decrease of 24,713 barrels and a decrease in valuation of $166,535 under 1908.

The total number of passengers arriving and departing was 51,423.

Average net registered tonnage recorded at Duluth, exclusive of tugs, 3,058.

Vessels recorded at Duluth Canal were: Entering, 4,385; departing, 4,273; total, 8,658.

Vessels recorded at Wisconsin entry were: Entering, 824; departing, 1,021; total, 1,845.

Average number of tons cargo received per day at Duluth and Superior, 27,261.

Average number of tons of cargo shipped per day from Duluth and Superior, 102,855.

The navigation season covered a period of two hundred and fifty days. This is reckoned from the first departure or arrival to the last departure or arrival to or from the lower lakes. The open season for Duluth-Superior Harbor to and from Lake Superior ports only was much longer, as some local boats ran all but two months of the year.

Duluth Canal.—First departure for lower lakes, April 17; first boat entered from lower lakes, April 28; last boat departed for lower lakes, December 10; last boat arrived from lower lakes, December 22; north shore boats were running at close of calendar year.

Wisconsin entry.—First boat arrived from lower lakes, April 28; first boat departed for lower lakes, April 27; last boat arrived from lower lakes, December 8; last boat departed for lower lakes, December 9.

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Duluth, Minn., for the calendar year 1909.

[Season of navigation opened April 17; closed, December 22.]

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	7,939	200	8,139	20,821,021	49,832
Sailing [a]	638	5	643	1,079,148	....
Total	8,577	205	8,782	21,900,169	49,832

[a] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Arrivals and departures for each month, with net registered tonnage.

Month.	Arrivals.	Departures.	Total.	Tonnage.
January	17	15	32	3,400
February	3	1	4	85
April	52	53	105	12,252
May	430	412	842	2,101,863
June	545	528	1,073	2,745,173
July	657	644	1,301	3,307,998
August	627	618	1,245	3,354,641
September	655	652	1,307	3,398,688
October	645	644	1,289	3,442,734
November	618	614	1,232	2,950,465
December	177	175	352	582,870
Total	4,426	4,356	8,782	21,900,169

Comparative statement for calendar years 1908 and 1909.

Year.	Arrivals.	Departures.	Total.	Registered tonnage.	Average tonnage.
1908	3,494	3,257	[a] 6,751	15,718,950	[b] 2,804
1909	4,426	4,356	[c] 8,782	21,900,169	[b] 3,058

[a] Steam, 6,383; tow, 368.

[b] Exclusive of tugs.

[c] Steam, 8,139; tow, 643.

Arrivals and clearances of vessels at Superior, Wis., for the calendar year 1909.

[Season of navigation opened April 27, closed December 9.]

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	4,266	104	4,370	13,059,055	1,591
Sailing [a]	104	3	107	191,710	....
Total	4,370	107	4,477	13,250,765	1,591

[a] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Arrivals and departures for each month, with net registered tonnage.

Month.	Arrivals.	Departures.	Total.	Tonnage.
April	2	6	8	29,551
May	211	249	460	1,267,433
June	296	255	551	1,611,109
July	362	315	677	1,971,228
August	306	285	591	1,899,198
September	342	338	680	2,004,604
October	350	336	686	2,190,393
November	340	339	679	1,944,509
December	83	62	145	332,740
Total	2,292	2,185	4,477	13,250,765

Comparative statement for calendar years 1908 and 1909.

Year.	Arrivals.	Departures.	Total.	Registered tonnage.	Average tonnage.
1908	1,868	1,869	[a] 3,737	10,341,009	[b] 2,996
1909	2,292	2,185	[c] 4,477	13,250,765	[b] 3,258

[a] Steam, 3,583; tow, 154.

[b] Exclusive of tugs.

[c] Steam, 4,370; tow, 107.

Freight traffic.

RECEIPTS AND SHIPMENTS, WITH VALUATIONS, FOR CALENDAR YEAR 1909—DULUTH AND SUPERIOR COMBINED.

Description of cargo.	Unit.	Quantity.	Unit price.	Valuation.
RECEIPTS.				
Cement	Tons	108,013	$5.50	$594,072
Coal:				
Hard	do	1,137,378	6.25	7,108,613
Soft	do	4,525,329	3.25	14,707,319
Fish	do	3,181	50.00	159,050
General merchandise	do	211,735	185.00	39,170,975
Gravel	Cubic yards	86,698	1.10	95,368
Limestone	Tons	66,196	1.30	86,055
Lumber	M feet	12,377	20.00	247,540
Machinery	Tons	4,924	375.00	1,846,500
Manufactured iron	do	350,340	26.00	9,108,840
Oils:				
Kerosene	Barrels	100,584	6.25	628,650
Gasoline	do	12,333	7.75	95,581
Lubricating	do	4,878	10.00	48,780
Piles	Number	2,272	4.90	11,133
Poles	do	108,485	1.15	124,758

Freight traffic—Continued.

RECEIPTS AND SHIPMENTS, WITH VALUATIONS, FOR CALENDAR YEAR 1909—DUTH AND SUPERIOR COMBINED—Continued.

Description of cargo.	Unit.	Quantity.	Unit price.	Valuation.
RECEIPTS—continued.				
Posts	Number	2,359	$0.08	$189
Salt	Tons	87,964	5.60	492,593
Sand	Cubic yards	86,540	.75	64,905
Stone, building	Tons	12,286	4.70	57,744
Ties	Number	153,976	.45	69,289
Unclassified	Tons	13,661		786,802
Total				[a] 75,504,761
SHIPMENTS.				
Barley	Bushels	9,606,275	.61+	5,923,280
Copper	Tons	30,834	230.00+	7,111,380
Corn	Bushels	1,248,439	.71+	896,727
Flax	do	9,480,917	1.70+	16,180,732
Flour	Barrels	4,161,333	5.72+	23,804,706
General merchandise	Tons	20,967	185.00	3,878,895
Iron ore	do	22,478,639	2.65	59,568,393
Lumber	M feet	267,696	20.00	5,353,920
Oats	Bushels	3,821,258	.44+	1,684,373
Rye	do	471,758	.68+	325,393
Shingles	Tons	75,898	30.00	2,276,940
Wheat	Bushels	54,344,029	1.01+	55,176,553
Wool	Tons	3,650	700.00	2,555,000
Unclassified	do	44,849		1,268,106
Total				186,004,398
Grand total (32,529,301 tons)				[a] 261,509,159

[a] Not including logs.

Total tons received, 6,815,410. Passengers arrived, 25,908.
Total tons shipped, 25,713,891. Passengers departed, 25,515.
Passengers arriving and departing, 51,423.

All tons are of 2,000 pounds. Average haul, 809 miles. Rate per ton-mile, 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior, and for each commodity.

The storage capacity of Duluth-Superior elevator system is 32,475,000 bushels; that of Duluth elevators is 14,625,000; that of Superior is 17,850,000.

Value of imports during fiscal year 1910, $233,195.30; value of domestic exports, $10,159,431.87; duties collected, $44,044.07.

Thirteen large new boats were added to the shipping fleet during the fiscal year 1910. Several of these were built to take the place of boats wrecked during the previous year. No new lines of transportation were established.

II 4.

IMPROVEMENT OF HARBOR AT PORT WING, WISCONSIN.

For a detailed description of this harbor see the Annual Reports of the Chief of Engineers, United States Army, for the years 1900–1909. The estimate of cost of original project is increased $56,539 on account of underestimate of dredging in the first place. This was authorized by the Chief of Engineers June 18, 1908.

Dredging for the removal of shoals was executed under contract and completed October 1, 1909. Details of this work and of the resulting depths are given in summary.

The latest survey of this harbor was made July 1, 1910, and showed but very little change in depth through the government channel since the completion of last year's dredging. Some shoaling has occurred in the private channel along the lumber dock, but not such as to prevent its use by vessels, and it is expected that further private dredging will be done.

No deterioration has taken place during the fiscal year by destruction, decay, obstructions, or otherwise. The lumber business at this harbor continues active. It is expected that 7,600,000 feet of lumber and lath will be manufactured this season, and all is to be shipped by water. A stone quarry is in operation. A fish company has been added to the enterprises of the harbor during the year and has built a dock and a large warehouse for its business, and the surrounding country is developing rapidly in agriculture. For these reasons I am of the opinion that this locality is worthy of further improvements to the extent of completing the present project and maintaining same.

Regarding details of work under the approved project remaining uncompleted, with revised estimate of cost, see Annual Report for 1908, page 1913.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $3,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

June 13, 1902	$25,000
March 3, 1905	19,992
March 2, 1907	2,000
March 3, 1909 (allotment)	5,000
June 25, 1910	5,000
Total	56,992

ABSTRACT OF CONTRACTS IN FORCE.

Emergency contract was entered into April 14, 1909, with the Northern Dredge and Dock Company, of Duluth, Minn., for dredging at 17¾ cents per cubic yard. Amount of contract about $4,500. Work commenced immediately and completed October 1, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Port Wing, Wis., for the calendar year 1909.

[Season of navigation opened April 17, closed December 22.]

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered, steamers[a]	170	170	22,610	284
Total	170	170	22,610	284

[a] No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor were registered.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
General merchandise	900	Lumber, pine (5,500,000 feet)	8,250
		Lumber, hardwood (1,000,000 feet)	2,000
		Poles (84,000 pieces)	10,500
		Posts and ties (23,000 pieces)	940
		Lath (1,500,000)	375
		Stone	6,750
		Miscellaneous	30
Total	900	Total	28,845

Total receipts and shipments, 29,745 tons. Increase over 1908 equal to 29 per cent.

Total valuation, $447,595. Increase over 1908, $134,654, equal to 43 per cent.

Average haul, 809 miles; rate per ton-mile, 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

I I 5.

IMPROVEMENT OF HARBOR AT ASHLAND, WISCONSIN.

For a detailed description of this harbor, see earlier annual reports; also Bulletin No. 19, pages 41–43, issued by the United States Lake Survey.

During the year ending June 30, 1910, work was done by the United States as follows:

Strengthening the breakwater.—The breakwater, as originally built, was of pile, slab, and rock ballast construction. Work of revetting this structure with sandstone riprap to form a permanent rubble mound breakwater was commenced in 1903 and completed October 20, 1909. Under the A. Sang contract there were 17,777 tons of sandstone riprap placed between the dates of July 8 and October 20, 1909, which covered the easterly 458 linear feet. Price was $1.05 per ton, or $18,665.85.

Details of amount and cost for previous contracts on this work are given in tabulated form in the Annual Report for 1909, Appendix I I, page 1918. The total amount of this work of sandstone revetment has been 172,966 tons, at a contract cost of $157,191.30.

The work of covering with granite riprap those portions of the breakwater revetted under the earlier contracts where settlement and wear of the sandstone had occurred, was begun May 11, 1910, by A. Sang, contractor, and continued until June 30, when the the contract terminated. There were placed 4,466 tons, at the price of $2.10, or $9,378.60. This covered a distance of 644 feet, beginning with the east end of the narrow, or 20-foot width, at station 1021 (which is 1,021 feet from the east end of the entire breakwater), which also was the starting point of the sandstone revetment in 1903.

The granite was quarried at Mellen, Wis., and hauled by rail a distance of 25 miles on flat cars, for which the railroad charged the contractor 40 cents per ton. The contractor loaded the rock on the cars at the quarry and unloaded the rock from the cars to a flat scow at the Commercial dock at Ashland by means of a derrick at each place. The scow was towed to the breakwater, a distance of two miles, and the rock placed in position by means of a derrick mounted on the breakwater and moved along on the completed part as the work progressed. Two flat scows were used, carrying usually 100 to 150 tons at a load. The weight of the granite was 171.8 pounds per cubic foot.

The rock was in rough, irregular pieces as it came from the quarry. About two-thirds of the rock is in pieces of 25 to 70 cubic feet, and weighing from 2 to 6 tons, and the remainder of smaller pieces placed in cavities between the larger rock.

The weight of the rock was determined by water displacement, using two water glasses with scales of tons, placed inside the hull over the keel or middle line, each one at a distance from the middle of the load water line equal to 57 per cent of the half length of the load water line. These are points which would be unaffected by the sagging of the scow under a uniform load, with a portion of the scow at each end without rock, as computed from a formula for an elastic curve.

Plans and estimates for the extension of the main breakwater for a distance of 637 feet to the west, to the full project length of 8,000 feet are given in the Annual Report for 1909, page 1919, in which a rubble mound resting on an embankment of earth is substituted for the original pile and slab structure, and a pierhead provided.

WORTHINESS OF IMPROVEMENT.

Channels.—In my opinion the present channel is worthy of further improvement, by widening and maintenance, as per reports in House Document No. 536, Sixty-first Congress, second session.

Main breakwater.—The main breakwater, which has been built in one piece, to a length of 7,363 feet, is worthy of further improvement, by maintenance, and by extending its length 637 feet to the west to the projected total length of 8,000 feet.

Breakwater farther east.—The main breakwater stands with its east end at the harbor line, 2,200 feet from the shore. The act of March 3, 1899, authorized the extension of the breakwater to the shore, and in 1900 the construction of this portion was commenced, and 91 linear feet were constructed at the shore end, when it was interrupted by the act of June 6, 1900, which provided as follows:

> * * * That in lieu of completing the shore end of the breakwater at Ashland, Wisconsin, as provided for in the river and harbor act of March third, eighteen hundred and ninety-nine, there shall be substituted a breakwater, starting at a point on the shore about two thousand six hundred feet east of the point at which the existing shore arm of breakwater would meet shore if prolonged, and running in a direction parallel to existing breakwater for a distance of four thousand seven hundred feet, or of such length as may be necessary to fully protect the harbor of Ashland.

The contract work already begun on the former line was accordingly shifted to the new location, and a length of 842 feet constructed, of the same original type, consisting of piles, slabs, and rock ballast, and at a cost of about $30,000, including claims for damages which were allowed the contractors on account of change in location involving greater difficulties and greater expense. No further construction has been made since that time.

This breakwater was never recommended by the district officer nor by the department at Washington. The authorizing act was due to the efforts of private parties in Ashland who had projects for improvement in that locality which would be benefited by such a breakwater. The projects for private improvement were never carried out, and the chief promoter has died.

The occasion for building this breakwater, if it were ever justified at all, has now passed away. There is ample room available to the west of the main breakwater, and under its protection, for any and all possible future private improvements along the Ashland Harbor front, as far as can now be foreseen. For these reasons I am of the opinion that the easterly breakwater is unworthy of further improvement.

IMPROVEMENT.

Widening channel to 200 feet, to complete	$26,000
Extending breakwater 637 feet	25,000
Total for improvement	51,000

MAINTENANCE.

Removing shoals and other contingencies	$4,000
Total expenditure, in adition to unexpended balance	55,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$51,000	
For maintenance of improvement	4,000	
		[a] $55,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

August 5, 1886	$22,500	June 13, 1902	$40,000
August 11, 1888	60,000	March 3, 1905	60,000
September 19, 1890	60,000	March 2, 1907	90,000
July 13, 1892	45,000	March 3, 1909	25,000
August 18, 1894	25,000	June 25, 1910	30,000
June 3, 1896	27,000		
March 3, 1899	35,000	Total	519,500

ABSTRACT OF CONTRACTS IN FORCE.

Contract was entered into June 17, 1909, with Alex. Sang, of Duluth, Minn., for furnishing and placing about $25,000 worth of sandstone and granite alongside and on top of the breakwater, at $1.05 and $2.10 per ton of 2,000 pounds, in place, respectively. Contract approved by Chief of Engineers July 9, 1909. Work began immediately and completed by June 30, 1910.

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Chequamegon Bay (Ashland, Washburn, and Bayfield) for the calendar year 1909.

[Season of navigation opened April 23, closed December 6.]

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	2,331	34	2,365	3,843,718	[a] 47,771
Sailing [b]	....	1	1	885	....
Total	2,331	35	2,366	3,844,603	47,771

[a] Principally excursionists (see note below).

[b] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Increase in number of vessels, 876; increase in net registered tonnage, 1,177,401; average net registered tonnage, 1,625.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
Coal:		Iron ore	4,294,299
Soft	603,644	Pig iron	28,412
Hard	32,359	Stone	17,777
Miscellaneous merchandise	1,000	Lumber (59,231,000 feet)	88,778
Salt (1,380 barrels)	197	Lath (8,975,000)	2,244
Unclassified	290,804	Shingles (300,000)	30
		Miscellaneous merchandise	1,000
		Fish	682
		Unclassified	34,948
Total	928,004	Total	4,468,170

Average haul, 809 miles; rate per ton-mile, 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here given as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

Total receipts and shipments, 5,396,174 tons; increase, 1,737,644 tons, equal to 47 per cent.

Total valuation, $17,967,797; increase, $229,654, equal to 13 per cent.

In addition, there were 20,000,000 feet of logs towed in, valued at $280,000.

NOTE.—The local ferry business between Ashland, Washburn, and Bayfield amounted to 3,240 trips of boats, carrying 47,721 passengers. There is quite an extensive excursion business between the above-named towns and the Apostle Islands; also of tugs, of which no record is kept. It has been impossible to procure figures concerning the number of passengers carried on regular-line boats into and out of the principal ports on Chequamegon Bay.

Arrivals and clearances of vessels at Bayfield, Wis., for the calendar year 1909.

[These figures are included in those for Chequamegon Bay. Season of navigation opened April 23; closed December 6.]

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered steamers [a]	201	....	201	90,396	([b])

[a] All boats doing business with this harbor are registered.
[b] Principally excursionists. See note under Ahsland.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
Salt (1,380 barrels)	197	Lumber (36,973,000 feet)	55,460
Miscellaneous merchandise	1,000	Lath (8,975,000)	2,244
		Shingles (300,000)	30
		Fish	682
		Miscellaneous merchandise	1,000
Total	1,197	Total	59,416

In addition, 17,777 tons of stone were shipped to Ashland for the breakwater.

Total receipts and shipments, 60,613 tons. Total valuation, $1,172,489.

Average haul, 809 miles; rate per ton-mile, 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

II 6.

IMPROVEMENT OF HARBOR AT ONTONAGON, MICHIGAN.

For detailed accounts of the condition of this harbor in recent years and the operations of the Government for its maintenance, attention is invited to the Annual Reports of the Chief of Engineers, United States Army, for previous years. See also reports on preliminary examinations made in the years 1907 and 1909, relating to projects for further improvement, and printed in House Documents Nos. 444, Sixtieth Congress, first session, and 602, Sixty-first Congress, second session.

Work during the year.—Dredging for the removal of shoals and to maintain the project depth was executed as follows: From August 14 to September 9, 1909, 23,259 yards, at 17.9 cents, making a contract cost of $4,163.36. Again, in April 28 to May 27, 1910, 32,994 yards, at 15½ cents, $5,114.07. Total for the fiscal year, 56,253 yards, at a contract cost of $9,277.43.

The dredging done in the fall of 1909 was by the Northern Dredge and Dock Company, in completion of a contract began May 12, 1909. The total amount of this contract, which is the extent of dredging for the season of 1909, was 62,516 yards, at 17.9 cents, and contract cost of $11,190.36. The results of this dredging, as shown by a survey made in September, 1909, was a channel with a least depth of 14 feet (and generally 15 or 16 feet) from the lake through the entrance and up to the north end of the lumber dock on the west side of the harbor. The channel was 120 feet wide in the lake approach and for a distance of 300 feet inside the piers, and 60 feet wide from this point to the lumber dock. No dredging was done on the channel leading to the Commercial dock, but there was already an available depth in this channel of about 12 feet, due to the scouring of currents. The foregoing dredging, while not giving as wide channels as desired for the best results, yet enable vessels to enter the harbor and make shipments.

An examination made at the opening of navigation in 1910 showed some shoaling since the dredging of the previous season, although not as much as in previous years. Further dredging was done in April and May, by the Northern Dredge and Dock Company, to remove shoals from the lake approach and from the channels leading to the west lumber dock and to the commercial dock. No dredging was done in the channel between the entrance piers (except a little near the inner ends), as there was found an available depth of 13.7 feet in this portion. The amount of 32,994 yards was dredged, at 15½ cents, which is the lowest price ever paid for work at this harbor.

A survey made June 14, 1910, after completion of the dredging, showed a depth of 16 to 19 feet in the lake approach and width of 150 feet, which had been dredged deeper to provide a greater margin against filling. Between the entrance piers there is a narrow channel with a depth of 14 feet and a width of 100 feet for a depth of 12 feet. The channels leading to the wharves have a depth of 14 feet or more.

Private dredging deepened a channel in front of the Ontonagon Lumber and Cedar Company's dock to 16 feet for a portion of the distance and 12 feet for the remainder, up to the county bridge. Above the bridge there is a depth of about 8 to 10 feet available along the dock of the above-named company, and vessels are here given a partial load of lumber and then taken below the bridge and fully loaded in deeper water.

The channel through the entrance piers is near the west pier.

To find the best water a vessel should steer a course about 50 feet from the west pier, and parallel to the pier.

It is expected that about fifteen million feet of lumber will be shipped this season by water from this harbor.

Repairs.—The outer portion of the west entrance pier was given quite extensive repairs, for a distance of 340 linear feet, the deck of which had been broken up by storms and decay, and the ballast settled in the pockets. Repairs consisted of renewing the upper two courses of wall timber. the upper ties. leveling up settlements, refilling the pockets with sandstone taken from another portion of the pier where there was an excess of rock, and laying a new deck. This work was done between the dates of July 13 and August 31, 1909, by hired labor and purchase of material. A small derrick scow was loaned from the Superior Entry work for this purpose. About 100 tons of rock was broken up into a size for handling and moved from another part of the west pier to fill the empty pockets. Labor amounted to $665.25 and materials to $912.90, making a total cost of $1,578.15. Average cost per linear foot of the pier was $4.64.

Repairs are urgently needed for the remainder of the west pier, and for the southerly half of the east pier.

Some repairs were also made to the deck of the east pier, in May and June, 1910, where a number of the planks were gone. This work was done by hired labor and purchase of material, at a cost of $107.21.

The following figures show the amount of dredging done from time to time for the purpose of keeping the channel open since the date of completion of the government improvements in 1889:

Dredging of shoals.

Calendar years:	Yards.
1891	22, 936
1894	33, 817
1903	18, 054
1905	36, 310
1906	23, 937
1907	70, 335
1909	62, 516
1910	32, 994

APPROPRIATIONS.

March 2, 1867	$97, 600
July 7, 1870	10, 000
June 23, 1874	23, 000
March 3, 1875	25, 000
August 14, 1876	15, 000
June 18, 1878	15, 000
March 3, 1879	17, 000
June 14, 1880	15, 000
March 3, 1881	20, 000
August 2, 1882	20, 000
July 5, 1884	15, 000
August 5, 1886	13, 000
August 11, 1888	12, 500
September 19, 1890	10, 000
July 13, 1892	$20, 000
August 7, 1894	7, 000
June 3, 1896	10, 000
Received on account of damage to piers	28
June 13, 1902	5, 000
March 3, 1905	3, 000
March 3, 1905 (allotments)	10, 000
March 2, 1907	5, 000
March 2, 1907 (allotments)	10, 000
March 3, 1909 (allotment)	20, 000
June 25, 1910	25, 400
Total	423, 528

ABSTRACT OF CONTRACTS IN FORCE.

Emergency contract was entered into April 14, 1909, with Northern Dredge and Dock Company, of Duluth, Minn., for dredging about $10,000 worth of shoals, at 17.9 cents per cubic yard. Work commenced promptly and was completed October 1, 1909.

Emergency contract was entered into April 20, 1910, with Northern Dredge and Dock Company, of Duluth, Minn., for dredging about $5,000 worth of shoals. at 15½ cents per cubic yard. Work commenced at once and was completed May 27, 1910.

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Ontonagon, Mich., for the calendar year 1909.

[Season of navigation opened April 21; closed December 10.]

Class.	American.	Total.	Net registered tonnage.
Registered:			
Steamers	340	340	124,200
Barges[a]	38	38	13,340
Total	378	378	137,540

[a] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor were registered.

Increase in number of vessels over 1908, 12. Increase in registered tonnage, 1,490.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
General merchandise	600	Lumber (10,001,000 feet)	15,002
Fish	18	Shingles (360,000)	36
Poles (4,000 pieces)	500	Lath (415,000)	104
Ties (6,000 pieces)	330	Farm produce	130
Coal	150	Total	15,272
Total	1,598		

Total receipts and shipments, 16,870 tons. Increase over 1908, 3,821 tons; equal to 29 per cent.

Total valuation, $325,733. Increase over 1908, $71,711; equal to 28 per cent.

In addition to the above there were 2,000,000 feet of logs received and 750,000 shipped, valued at $38.500. Decrease in logs, 1,320,000 feet; equal to 32 per cent. Decrease in value of logs, $21,940; equal to 36 per cent.

Average haul 809 miles, rate per ton-mile 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

II 7.

KEWEENAW WATERWAY, MICHIGAN.

For the history of this waterway and its purchase by the United States, see Report of the Chief of Engineers for 1892, Appendix II, page 2158. For the work of improvement by the United States, see subsequent annual reports. A complete detailed description of this waterway is also given in Bulletin No. 19, published by the Survey of Northern and Northwestern Lakes, April, 1910, pages 73 to 77. See, also, chart, in colors, issued March 15, 1905, by the Survey of Northern and Northwestern Lakes.

The approved project for improvement is not fully completed, although nearly so, and the river and harbor act of March 3, 1905, appropriated $45,000 for "continuing improvement."

No work of improvement was done during the last fiscal year.

The suit instituted by the United States against Porter Brothers for the recovery of money claimed to have been illegally paid them under a contract, as noted in my annual report for 1909, page 1926, was dismissed on October 30, 1909, by motion of the United States attorney, or by consent of the parties, and never came to trial.

The large commerce carried through the Portage Lake canals is evidence of the importance of this waterway and of the benefits derived from its improvement.

The needs of further improvements to this waterway are receiving consideration. One needed improvement is the construction of a harbor of refuge near the lower end of the waterway, just inside the mouth of Portage River, somewhat similar to the harbor of refuge near the upper end known as Lily Pond. A preliminary examination of this locality, with plans and estimates, were duly authorized, and have been reported by me as an improvement worthy of being undertaken by the Government. This opinion was concurred in by the division engineer, by the Board of Engineers for Rivers and Harbors, and by the Chief of Engineers. These reports are printed in House Document No. 325, Sixtieth Congress, first session, and attention is invited thereto.

Congress has now, by act of June 25, 1910, appropriated money for commencing this work.

Another possible improvement that would be of value is to straighten the channel of Portage River by cutting off Princess Point, with its sharp bend—a bend that is causing some inconvenience to the larger class of vessels, especially passenger boats that now use this waterway. The condition at this point has been very much improved by the work done during the fiscal year ending June 30, 1905, but it will always present some difficulties to the navigator unless straightened.

In my last annual report (Appendix I I, pp. 1926–1927) attention was invited to the need of certain improvements at the upper entrance of the waterway, consisting of deepening the shoal areas within the breakwaters and removing the outer portion of the old timber piers, which formed the original entrance to the waterway, for the purpose of making more room for vessels in passing from the outer opening to the inner entrance, and to form a larger stilling basin for the reduction of waves. This will form one of the subjects of a preliminary examination authorized by act of June 25, 1910.

The remaining balance of these appropriations ($1,806.29) was intended for the renewal of some of the old revetments, which were in poor shape when the canal was purchased by the United States. Every cut was revetted with a timber-and-pile revetment to prevent wash of the banks. In many cases the cuts were through clay and in swamps, and it is not believed that much wash will occur, especially as the portion of the revetment below water will not decay. For this reason it has been decided not to renew useless woodwork, which will again decay, and the revetments in some places will be allowed to remain as they are until the necessity for their renewal shall be demonstrated.

Worthiness of further improvement.—In view of the amount of commerce passing through this waterway, and of that transacted at the several towns located thereon, all of which is aided by this waterway and much of it impossible without the improvements already made, and of its value as a refuge to vessels from stress of weather, I am of the opinion that it is worthy of further improvement, to the extent of the several plans outlined in the present and previous reports and of continued maintenance.

OPERATING AND CARE.

Location.—The Keweenaw waterway extends across Keweenaw Point, in the State of Michigan, from Keweenaw Bay to Lake Superior, there being about 25 miles of water route, consisting of 5½ miles of Portage River with its four cuts, 17 miles of Portage Lake, and 2¼ miles in the upper canal from the head of Portage Lake to Lake Superior.

Under authority of the river and harbor act of September 19, 1890, the Secretary of War allotted $16,000 for operating and care of canals and other works of navigation to be applied to Portage Lake and Lake Superior canals, Michigan, for the fiscal year ending June 30, 1910.

The approved project for the expenditure of this allotment is to maintain the depth and width obtained by the work of improvement; to keep a record of the vessels and their tonnage using the canals; to exercise the necessary care in enforcing regulations for the use of the canals; to make frequent surveys to determine changes and to check up work done in dredging; to guard against encroachments on the legally established harbor lines; and to perform other work incident to the operation and care of the canals. The amount allotted has been expended in carrying out the above programme of duties, except $850, which was reported and deducted from the estimate made for next year.

Following is a detailed statement of operations under "Operating and care" during the fiscal year ending June 30, 1910.

Dredging of shoals.—Dredging was done under contract with the Northern Dredge and Dock Company between the dates of July 12 and August 9, 1909, to the amount of 19,655 yards, at a price of 23¼ cents per yard. The cost, including inspection, was $4,842.38. The shoals removed were in the lower portion of Portage River, at several points within 1 mile of the entrance. This, it is believed, leaves the waterway free from shoals, with the exception of the entrance at Keweenaw Bay, where there are some shoals in the lake approach and alongside the entrance pier, with 18 to 20 feet at low water, which are intended to be removed the coming year. The least depth along the axis of the channel in this locality is about 19½ feet.

Surveys have been made of portions of the waterway, to show condition of recently dredged areas, to ascertain whether shoaling had occurred in other places, and to show the condition of the embankments at the base of the piers of the breakwaters at upper entrance. A submarine diver was employed to make a careful examination of the timber cribs of the breakwaters, resulting in the discovery of several breaks in the walls on the lake side. This examination was in progress at the close of the fiscal year.

A trip was commenced with the U. S. tug *Circle* May 16, 1910, in search of suitable hard rock, with a view to its use for riprap purposes at the breakwaters at the upper entrance. On this trip the tug ran on a rocky bottom while cruising inshore 4 miles east of Eagle Harbor May 17, and sank. The tug was raised a few days later and brought to Houghton, placed on a dry dock for repairs to her damaged bottom planks, keel, deck, etc. The cost of raising and repairing was $1,165.96, and the tug was placed in commission again June 8, 1910. The search for rock was not completed, but will be resumed later.

Repairs to structures.—Repairs to the old east pier at the upper entrance, which were commenced in June, 1909, were completed later in the season, and consisted in a renewal of the deck and upper timbers. The timber used for this work (38,000 feet b. m.) was part of a lot cut from the government land adjoining the waterway, which had recently been burned over, as noted in my last annual report. The cost of labor for these repairs was $325.05, of which $203 was expended in the fiscal year ending June 30, 1910. Much of the labor on these and other repairs was performed by the crew of the government tug and by the United States watchman at Lily Pond Harbor, which is not included in statement of cost.

Repairs were made to the east breakwater at upper entrance of damage caused by storm of October 11–16, 1909, at cost for labor of $120; repairs to mooring pier at Lily Pond Harbor by renewal of wale timbers at cost for labor of $211. Fourteen thousand one hundred and seventy-six feet, board measure, of government timber was used. Repairs to revetments at upper canal were made where damaged by a vessel, at cost of $213 for labor and iron; seven thousand feet, board measure, government timber used. Additional repairs were made to the breakwaters where damaged by storms, at a cost of $82 for material and labor. This work is not completed, and much more extensive repairs to the breakwaters will be required.

Four vessels collided with the timber revetments while passing through the waterway, causing more or less damage at six places, the extent of the damage being small, with the exception of one noted above. A few groundings occurred in the waterway, without serious damage and with but few hours delay in any case. A collision occurred April 28, 1910, in which the schooner *Athens* was quite badly damaged above the water line by the steamer *Mahoning*.

Attention is further respectfuly invited to the necessity of placing an embankment of riprap at the base of the breakwaters at the upper entrance, on the lakeward side, where the original embankment, consisting of pieces too small for requisite stability, has worn away by wave action and undermined the walls of the timber cribs in places, causing a loss of stone ballast from some of the compartments and damage to the crib walls and deck timbers.

A plan has been prepared, under my direction, by J. H. Darling, principal assistant engineer, for riprapping the seaward base of the piers with large pieces of hard rock for a linear distance of 2,550 feet, so as to form a berm about 17 feet wide, the top of the berm to be about 6 feet above the bottom of the crib and 12 feet below the surface of the water. See following estimates:

Estimates of quantities and costs.

Riprap of granite or trap, in pieces of 5 to 8 tons and smaller:		
Section within broken lines	square feet	138.2
Add for waste and excess, 25 per cent	do	34.5
Total	do	172.7
Volume per linear foot	yards	6.4
Weight per linear foot	tons	8.0
Weight for 2,550 feet	do	20,400.0
20,400 tons, at $2 in place		$40,800
Administration and contingencies		9,200
Total cost		50,000

This work is urgently needed for the maintenance of the breakwaters and the prevention of serious injury.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $70,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

September 19, 1890:	
For the purchase of Portage canals	$350,000.00
For maintenance to June 30, 1892	10,000.00
For harbor lines, Portage Lake	5,128.70
Total	365,128.70

The above amounts were expended for the purposes for which appropriated.

FOR IMPROVING WATERWAY FROM KEWEENAW BAY TO LAKE SUPERIOR, MICHIGAN.

July 13, 1892	$50,000.00
August 18, 1894	130,000.00
June 3, 1896	50,000.00
June 4, 1897	350,000.00
July 1, 1898	450,000.00
June 6, 1900	110,000.00
March 3, 1901	145,000.00
June 28, 1902	$10,000.00
March 3, 1905	45,000.00
June 25, 1910	35,000.00
Miscellaneous	237.68
Total	1,375,237.68

The following statement shows the manner in which the appropriations have been expended. The amount expended under the different classes of work includes the cost of examinations, soundings, superintendence, buoying, and contingencies.

Dredging	$531,163.72
Pier work, revetment, etc	793,061.67
Purchase of land	9,406.00
Tug and scow, etc	4,800.00
Total	1,338,431.39

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[a] Exclusive of the balance unexpended July 1, 1910.

Allotments for operating and care of Portage Lake and Lake Superior canals, Michigan, from the permanent indefinite appropriation act of July 5, 1884, for operating and care of canals, etc.

Total to June 30, 1902[a]	$112,057.64
July 1, 1902	9,000.00
July 1, 1903	15,500.00
July 1, 1904	15,000.00
July 1, 1905	8,500.00
July 1, 1906	9,250.00
July 1, 1907	$12,900.00
July 1, 1908	12,000.00
July 1, 1909	15,150.00
July 1, 1910	85,000.00
Total	294,357.64

Summary of expenditures made from appropriations for operating and care of canals and other works of navigation (indefinite), act of July 5, 1884, applied to Portage Lake and Lake Superior canals, Michigan, during fiscal year 1910.

Date.	Office expense.	Field service.	Pier and revetment repairs.	Miscellaneous.	Total.
1909.					
July	$81.30	$766.46	$211.13		$1,058.89
August	76.80	5,323.74		$45.50	5,446.04
September	126.50	574.34		25.75	726.59
October	75.00	624.55	35.06	13.25	747.86
November	107.94	583.96	84.53	14.98	791.40
December	224.00	198.80			422.80
1910.					
January	225.00	173.97	178.00	133.57	710.54
February	202.00	205.89	166.40	318.18	892.47
March	217.60	224.02	59.50	12.80	513.92
April	127.00	546.13	21.00	41.35	735.48
May	102.00	1,477.85	10.90	278.89	1,869.64
June	146.74	1,008.61	71.20	7.82	1,234.37
Total	1,711.88	11,708.31	837.72	892.09	15,150.00

ABSTRACT OF CONTRACTS IN FORCE.

Emergency contract entered into July 8, 1909, with the Northern Dredge and Dock Company, of Duluth, Minn., for dredging about $5,000 worth of shoals in Portage Lake canals, at 23½ cents per cubic yard. Work commenced at once and was completed August 9, 1909.

Explanatory notes and general information.

The following records are for vessels passing through Portage Lake ship canals, Michigan, also for vessels entering the canals from either direction and discharging or loading at a port within the waterway. The report is divided into three parts or general divisions, namely, through commerce, local commerce, and through and local commerce.

Local traffic is not recorded, that is, vessels trading between points on Portage Lake and Torch Lake.

The ton, as used in all these tables, is 2,000 pounds.

Unit values for items of freight, and factors for converting various units of measurement into tons, are the same as used in the compilation of Duluth-Superior commerce for 1909, with but few exceptions.

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[a] See p. 274, H. Doc. No. 421, 57th Cong., 2d sess.

Table of equivalents for reducing quantities to ton of 2,000 pounds.

Article.	Equivalent.	Article.	Equivalent.
Cement	5 barrels=1 ton.	Oil	5 barrels=1 ton.
Flaxseed	56 pounds=1 bushel.	Salt	7 barrels=1 ton.
Flour	10 barrels=1 ton.	Sand	1 cubic yard=1⅓ tons.
Grain (except wheat and flax).	41+pounds(mean)=1 bushel.	Pulp wood	1,900 pounds=1 cord.
		Shingles	10 M=1 ton.
Lath	4,000=1 ton.	Ties, railroad	18 ties=1 ton.
Lumber, green	1 M=1¾ tons.	Telegraph poles	5 poles=1 ton.
Lumber, dry	1 M=1¼ tons.	Wheat	60 pounds=1 bushel.

Attention is invited to the within diagrams, showing a comparison of the largest cargoes carried, and amount of freight passing through the waterway by years since 1892, or since the Government took charge of these canals, also the amount of freight by months during the year.

More of the larger class of vessels have continued to use these canals during the past year, and most of them passed through the waterway without trouble; however, the channels are narrow for this class of vessels and in consequence accidents have occurred, such as groundings, collisions with revetments, etc.

The Houghton-Hancock bridge has given good service during the year and boats have had little trouble passing through it.

As usual, the heaviest commerce through the waterway was during October and November, or during the stormy season, which shows clearly that these canals are used for refuge to a great extent, as there are more boats navigating Lake Superior during the summer months.

Remarks on marine commerce of Portage Lake ship canals, Michigan, during calendar year 1909.

Logs to the amount of 9,619,000 feet b. m., valued at $134,666, were towed through the canals, made up into 48 rafts—8 up and 40 down bound. There were also 323 scows—163 up and 160 down bound, and 55 sets of booms towed through the waterway which are not included in this statement.

Total vessel freight up and down during the year was 2,544,073 tons, valued at $85,266,001. Fifty per cent of this freight, or 1,271,130 tons, valued at $32,473,796, was local commerce—that is, freight carried by vessels which entered from either direction and was shipped or received at a port within the waterway.

Increase in freight tonnage over 1899, 60.8 per cent.

Increase in freight tonnage during past year, 12.4 per cent.

In some commodities there is shown an increase of freight carried over last year, amounting to 332,627 tons, the principal commodities showing this increase being refined copper, grain, manufactured iron, iron ore, limestone, lumber, miscellaneous merchandise, pig iron, salt, building stone, shingles, and wheat. A decrease of 52,468 tons is shown in other commodities, the principal ones being soft coal, mineral copper, flaxseed, flour, sand, and unclassified.

The navigation season covered a period of two hundred and twenty-six days, extending from the opening on May 4 to the closing on December 15.

The earliest opening of these canals was April 4, 1902; the latest opening, May 9, 1893; the average, April 23. The earliest closing, November 26, 1896; latest closing, December 15, 1909; average, December 6. These statistics have been compiled in the local office at Houghton, Mich., by George H. Banks, junior engineer, overseer, from vessel reports made in compliance with the act of Congress approved February 21, 1891.

THROUGH MARINE COMMERCE, 1909.

Portage Lake ship canals, Michigan.—Quantities and values eastbound and westbound.

Commodity.	Unit.	Quantity.	Price.	Value.	Tons.
Cement	Barrels	79,150	$1.10	$87,065	15,830
Coal:					
Hard	Tons	41,022	6.25	256,388	41,022
Soft	do	144,211	3.25	468,686	144,211
Copper, refined	do	5,928	261.66	1,551,120	5,928
Flaxseed	Bushels	238.926	1.59	379,892	6,690
Flour	Barrels	1,219.810	5.72	6,977,313	121,981
Grains (except flax and wheat)	Bushels	1,226,786	.64+	787,713	29,969
Iron, manufactured	Tons	118.114	26.00	3,070,964	118,114
Iron ore	do	180,878	2.65	479,327	180,878
Laths	M	3,076	3.00	9.228	769
Limestone	Tons	41,385	1.30	53,801	41,385
Lumber	M feet	126,275	20.00	2,525.500	215,795
Machinery	Tons	85	375.00	31,875	85
Miscellaneous merchandise	do	168,349	185.00	31,144,565	168,349
Oil	Barrels	114,241	6.25	714,006	22,848
Pig iron	Tons	10,258	16.87	173,052	10,258
Pulp wood	Cords	4,269	5.75	24,547	4,055
Salt	Barrels	226.129	.80	180,903	32,304
Shingles	M	138.440	3.00	415,320	13,844
Ties, railroad	Number	13.235	.45	5.956	735
Wheat	Bushels	3,255.820	1.06	3,451.169	97,675
Unclassified	Tons	218		3,815	218
Passengers	Number	11,040			
Total				52,792,205	1,272,943

LOCAL MARINE COMMERCE, 1909.

Portage Lake ship canals, Michigan.—Quantities and values received and shipped.

[Aggregate of all the harbors.]

Commodity.	Unit.	Quantity.	Price.	Value.	Tons.
Cement	Barrels	30,620	$1.10	$33,682	6,124
Coal:					
Hard	Tons	67,868	6.25	424,175	67,868
Soft	do	1,012,383	3.25	3,290,245	1,012,383
Copper:					
Refined	do	62,048	261.66	16,235,480	62,048
Refined and mineral (C. & H.)	do	33,570	195.32	6,556,892	33,570
Flour	Barrels	12,820	5.72	73.331	1,282
Grain (oats)	Bushels	14,225	.48+	6,868	248
Iron, manufactured	Tons	7,035	26.00	182,910	7,035
Lath	M	50	3.00	150	13
Limestone	Tons	3,631	1.30	4,720	3,631
Lumber	M feet	10,906	20.00	218,120	18,685
Miscellaneous merchandise	Tons	28,584	185.00	5,288,040	28,584
Oil	Barrels	10,455	6.25	65,344	2,091
Pig iron	Tons	215	16.87	3,627	215
Poles, telegraph	Number	19,000	1.15	21,850	3,800
Salt	Barrels	7,283	.80	5,826	1,040
Sand	Cubic yards	7,357	.75	5,548	9,862
Stone, building	Tons	9,027	3.79	34,212	9,027
Ties, railroad	Number	15,000	.45	6,750	833
Wheat	Bushels	600	1.06	636	18
Unclassified	Tons	2,773		15,390	2,773
Total				32,473,796	1,271,130

In addition to the above there were 9,619,000 feet b. m. of logs, valued at $134,666.

Total number of passengers, 41091.

NOTE.—By local commerce is meant the vessel commerce of the towns on Portage Lake and Torch Lake. It does not, however, include the vessel business transacted between these towns.

THROUGH AND LOCAL MARINE COMMERCE, 1909.

Portage Lake ship canals, Michigan—Quantities and values, east and west bound, received and shipped.

Commodity.	Unit.	Quantity.	Price.	Value.	Tons.
Cement	Barrels	109,770	$1.10	$120,747	21,954
Coal:					
Hard	Tons	108,890	6.25	680.562	108,890
Soft	do	1,156,594	3.25	3,758,930	1,156,594
Copper:					
Refined	do	67,976	261.66*	17,786,600	67,976
Refined and mineral (C. & H.)	do	33.570	195.32	6,556,892	33,570
Flaxseed	Bushels	238.926	1.59	379,892	6,690
Flour	Barrels	1,232,630	5.72	7,050.644	123,263
Grain, except wheat and flax	Bushels	1,241,011	.64+	794,581	30,217
Iron, manufactured	Tons	125,149	26.00	3,253,874	125,149
Iron ore	do	180,878	2.65	479,327	180,878
Lath	M	3,126	3.00	9,378	782
Limestone	Tons	45,016	1.30	58.521	45,016
Lumber	M feet	137,181	20.00	2,743.620	234,480
Machinery	Tons	85	375.00	31,875	85
Miscellaneous merchandise	do	196,933	185.00	36.432,605	196,933
Oil	Barrels	124,696	6.25	779,350	24,939
Pig iron	Tons	10,473	16.87	176,680	10,473
Poles, telegraph	Number	19,000	1.15	21,850	3,800
Pulp wood	Cords	4,269	5.75	24,547	4,055
Salt	Barrels	233,412	.80	186,730	33,344
Sand	Cubic yards	7,397	.75	5,548	9,862
Stone, building	Tons	9,027	3.79	34,212	9,027
Shingles	M	138,440	3.00	415,320	13,844
Ties, railroad	Number	28,235	.45	12,706	1,568
Wheat	Bushels	3,256,420	1.06	3,451,805	97,693
Unclassified	Tons	2,991		19,205	2,991
Total				85,266,001	2,544,073

In addition to the above, 9,619,000 feet b. m. of logs, valued at $134,666, were towed through the canals.

Passengers, 52,131, of which 11,040 were through and 41,091 local.

Average haul, 809 miles; rate per ton-mile, 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

COMMERCIAL STATISTICS.

Through and local traffic, Portage Lake canals, Michigan, for the calendar year 1909.

[Season of navigation opened May 4, closed December 15.]

VESSEL CLASSIFICATION.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	1,981	8	1,989	2,069,101	52,131
Barges [a]	362		362	298,008	
Total	2,343	8	2,351	2,367,109	52,131

[a] The figures here given are for tow barges. No vessels enter these canals which depend on sails as means of navigation. All boats here given are registered.

These include all which passed entirely through, whether stopping at local ports or not, and all vessels which entered part way into the waterway and departed again the same way.

Through and local commerce, westbound and eastbound.

[Comparison with preceding year.]

Designation.	1908.	1909.
Number of vessels	3,085	2,984
Net registered tonnage	2,265,304	2,389,204
Freight in tons of 2,000 pounds	[a] 2,263,914	[b] 2,544,073
Valuation of freight	$77,323,898	[b] $85,266,001
Passengers	50,159	52,131

[a] This does not include 7,242,000 feet of logs, valued at $107,544.

[b] This does not include 9,619,000 feet of logs, valued at $134,666.

Openings and closings of navigation in Portage Lake ship canals, Michigan, while in charge of the United States, 1891 to 1910, inclusive.

Date of opening.	Steamer.	Date of closing.	Steamer.
April 26, 1892	Nipigon.	November 30, 1891	A. L. Hopkins.
May 9, 1893	Jos. L. Hurd.	November 30, 1892	S. F. Hodge.
April 22, 1894	Japan.	November 29, 1893	J. H. Shrigley.
April 25, 1895	Annie R. Hennes.	November 30, 1894	Jay Gould.
April 24, 1896	City of Duluth.	December 2, 1895	Matoa.
April 23, 1897	Peerless.	November 26, 1896	Cumberland.
April 17, 1898	Iroquois.	December 2, 1897	Japan.
May 1, 1899	R. G. Stewart.	December 4, 1898	Martin Swain (tug).
April 19, 1900	Bon Voyage.	December 15, 1899	Cora A. Sheldon, with whaleback No. 137.
April 23, 1901	Mable Bradshaw.		
April 4, 1902	Bon Ami.	December 8, 1900	Cuba.
April 15, 1903	W. H. Gratwick.	December 8, 1901	Clyde, with Amboy.
April 30, 1904	Tug Valerie.	December 13, 1902	Grover.
April 12, 1905	Schuylkill.	December 9, 1903	Hutchinson.
April 18, 1906	Philip Minch.	December 5, 1904	North Star.
May 7, 1907		December 11, 1905	Eber Ward.
April 22, 1908	Nellie Cotton.	December 10, 1906	
May 6, 1909		December 9, 1907	James Reid.
April 5, 1910	Tug Dan'l L. Hebard.	December 9, 1908	Northern Queen.
		December 15, 1909	Northern Light.

I I 8.

IMPROVEMENT OF HARBOR AT MARQUETTE, MICHIGAN.

For a history of this harbor, see Annual Reports of the Chief of Engineers for previous years.

For detailed description of this concrete work, with drawings, photographic views, cost, etc., see the Annual Reports, for 1896, pages 2365 to 2385; 1897, pages 2615 to 2638; and 1898, pages 2252 to 2282. The Annual Report for 1904, pages 2775 and 2776, gives a description and cross section of the latest portion of the work, which includes certain modifications in the method of construction found advisable by experience during the earlier progress.

The concrete superstructure is now built to a total length of 2,920 feet, which is 97 per cent of the entire length, and has been connected with the shore at the northerly end by building a protection wall 100 feet long. The concrete work stops 100 feet short of the end of the old breakwater, which will be completed in regular form in connection with the further extension of the breakwater, provided for by act of June 25, 1910.

Operations during the fiscal year have consisted in repairs to the breakwater. The last Annual Report described some damage to the concrete footing blocks by a storm on April 29–30, 1909. The three footing blocks displaced were taken up out of the way, the wall of the crib repaired, the upper timbers of which had been damaged, and the footing blocks replaced. In order to secure these and other footing blocks from displacement hereafter, which were not sufficiently covered by the monolithic concrete (as stated in last Annual Report, p. 1935), some reenforcing blocks of concrete were built over the footing blocks and anchored to the monoliths. These new blocks were 3 feet high, 10 feet long, so as to bring the joints between blocks directly opposite the joints of the monoliths, and the blocks were anchored to the old monolithic work by steel dowels. The widths of the new blocks varied according to the width of the uncovered portion of the footing blocks, and averaged about 2.9 feet. The new blocks made in effect an additional berm. The plan of construction is shown on the accompanying sketch.

This additional berm of concrete covered two portions of the breakwater, from station 8+61 to 11+2 (241 feet) and from station 13+2 to 14+92 (190 feet), making a total distance of 431 feet. Stations are reckoned from the north end of the breakwater.

The work was done between the dates of July 20 and September 22, 1909, by hired labor and purchase of material. A United States derrick scow belonging to the Keweenaw Waterway was made use of. A supply of crushed rock left over from former work was used, and some old concrete molds rebuilt for this work. Sand was purchased at 40 cents per cubic yard, delivered, Atlas cement at $1.50, and some new timber. The cost of the work, exclusive of material on hand and the use of the government scow, was $1,342.51, of which $1,008.98 was for pay rolls and $333.53 for material. The amount of concrete placed was 139 yards. The work has remained in good condition since its execution.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 20, 1912:		
For works of improvement	$78,000	
For maintenance of improvement	10,000	
		[a] 88,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total to include act August 11, 1888 (see p. 275, H. Doc. No. 421, 57th Cong., 2d sess.), under new project dated February 27, 1890, work commencing in 1895	$354,230.00
September 19, 1890	40,000.00
July 13, 1892	80,000.00
August 18, 1894	30,000.00
June 3, 1896	29,000.00
March 3, 1899	25,000.00
June 13, 1902	26,000.00
March 3, 1903 (sundry civil act)	80,000.00
March 3, 1905	3,000.00
March 2, 1907	30,000.00
June 25, 1910	100,000.00
Miscellaneous receipts	358.69
Total	797,588.69

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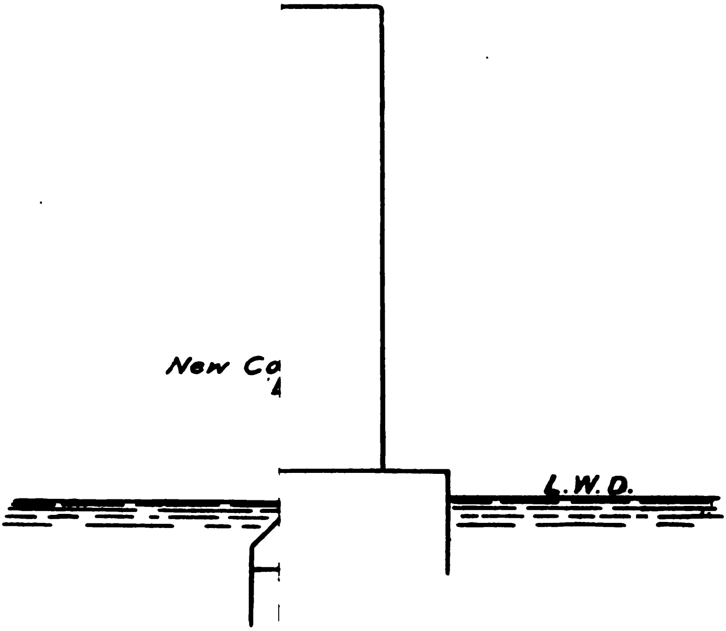
[a] Exclusive of the balance unexpended July 1, 1910.



Full lines show
size of new block
lines show minim

To accompany annual
report of Lt. Col. Graham
D. Fitch, Corps of Engrs.

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Marquette, Mich. (including Presque Isle, Mich.), for the calendar year 1909.

[Season of navigation opened April 21; closed December 12.]

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	949	6	955	2,730,627
Barges[a]	103		103	205,656
Total	1,052	6	1,058	2,936,283

[a] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Increase in number of vessels, equal to 75 per cent; increase in tonnage, 78 per cent.

Receipts and shipments of freight at Marquette, Mich. (including Presque Isle, Mich.), for the calendar year 1909.

Receipts.	Tons.	Shipments.	Tons.
Coal:		Iron ore	3,258,594
Hard	29,100	Pig iron	18,184
Soft	293,631	Lumber (1,000,000 feet)	1,500
Coke	79		
Nitrate of soda	5,574		
Manufactured iron	1,614		
Salt (3,100 barrels)	443		
Oil (6,130 barrels)	1,165		
General merchandise	9,300		
Total	340,906	Total	3,278,278

Total receipts and shipments, 3,619,184 tons. Increase over 1908, 1,618,962 tons, equal to 81 per cent.

Valuation, $12,803,440. Increase, $5.105.542, equal to 66 per cent.

These figures do not include tugs or scows or vessels which ran into the harbor for shelter.

Average haul, 809 miles; rate per ton-mile, 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

II 9.

HARBOR OF REFUGE, MARQUETTE BAY, MICHIGAN.

This harbor is also known as Presque Isle Harbor.

For the description of the locality and the interests to be benefited by the improvement, see Annual Report of the Chief of Engineers, United States Army, 1896, pages 2385, 2386.

For the work of improvement, see the Annual Reports of the Chief of Engineers, United States Army, for years 1897, 1901, and 1903. See also the current summary.

The approved project was for building 1,000 feet of breakwater running out from Presque Isle Point (built in 1897, 1899, and 1900), and afterwards for closing a gap between the breakwater and the shore by cribwork 216 feet long (built in 1902).

No work was done during the year.

Worthiness of further improvement.—There is a considerable commerce transacted at this harbor, consisting mainly of iron ore. The average amount of commerce for the last five years (1905 to 1909) has been 1,739,457 tons annually, with an estimated value of $5,053,593. This is likely to materially increase soon, on account of the discovery of new bodies of ore in the country tributary to this harbor. This is not a harbor of refuge, although this designation was applied by the original promoters. In stormy weather vessels have to run for shelter to Marquette. The improvement of this locality was never recommended by this office. I know of no reason why the ore could not all have been shipped as well from Marquette; but now that the ore dock and railroad have been built and ore shipments become an established fact, the breakwater affords a good deal of protection, which enables vessels to work in ordinary storms, and so is of service to navigation and commerce. For these reasons I am of the opinion that the locality is worthy of further improvement to the extent of maintaining existing improvements.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$2,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.	

APPROPRIATIONS.

June 3, 1896	$20,000
March 3, 1899	30,000
June 13, 1902	7,500
March 3, 1905	1,000
June 25, 1910	2,000
Total	60,500

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Presque Isle, Mich., for the calendar year 1909.

[Season of navigation opened, April 21; closed, December 12.]

Class.	American.	Total.	Net registered tonnage.
Registered:			
Steamers	459	459	1,500,698
Barges [b]	7	7	16,879
	466	466	1,517,577

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Increase in number of vessels, 181. Increase in registered tonnage, 854,653.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
Coal, soft	123,285	Iron ore	1,734,967
Coke	79	Pig iron	18,184
Manufactured iron	1,614		
Total	124.978	Total	1,753,151

Total receipts and shipments, 1,878,129. Increase, 905,622 tons, equal to 93 per cent.

Total valuation, $5,696,641. Increase, $3,038,660, equal to 114 per cent.

These figures do not include tugs or scows, or vessels which ran into the harbor for shelter.

Average haul, 809 miles. Rate per ton-mile, 0.78 mill.

The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

II 10.

IMPROVEMENT OF HARBOR OF REFUGE AT GRAND MARAIS, MICHIGAN.

For a history of this harbor and the work of improvement by the Government, see previous Annual Reports of the Chief of Engineers, beginning with 1881, Appendix E E 4, page 2038. See also Summary in present annual report.

Work during the fiscal year.—Dredging. A survey of the entrance channel made April 18–22 showed a sand bar in the lake extending entirely across the channel from west to east, the crest of which had from 14 to 15 feet of water over it and was at a distance of about 200 feet outside the outer end of the west pier. This bar had caused trouble to vessels in entering.

Under contract with the Edward Brothers Dredging Company this bar was removed and deepened so as to leave a depth of 23 to 25 feet at low water for a width of 360 feet beginning at 30 feet from the line of the west pier prolonged and reaching on the other side to within 110 feet of the line of the east pier prolonged, and covering a distance of about 400 feet lengthwise of the channel, from where the original depth was 20 feet, or about opposite the end of the west pier, out to the 20-foot depth in the lake. The depth of excavation was greater than usual in order to better maintain the project depth of 18 feet and to prolong the time for another bar to form to an extent that would obstruct vessels.

The dredging was commenced May 28 and completed June 28, 1910. The amount removed was 50,487 yards, and a deduction of 1,070 yards was made for overdepth—that is, for depths greater than 25 feet, the amount paid for being 49,417 yards, at a price of 22 cents, making the contract cost $10,871.74.

Repairs to piers.—At the opening of the season the west pier of the entrance was found to be considerably damaged from several causes. A large body of ice formed upon the outer portion of the pier by the freezing of spray during winter storms, as has occurred before, though not to so great an extent. The ice last winter attained a height in places exceeding that of the light tower of the front range light, reaching about 35 feet above the deck. The appearance of the ice is shown by accompanying photographs taken by local artists. The weight of this ice was sufficient to crush some of the deck timbers of the lower deck, which are 8 inches thick and supported at intervals of 7 feet 4 inches, and also break some of the tie timbers, 8 by 12 inches, with a span of 9 feet between supports.

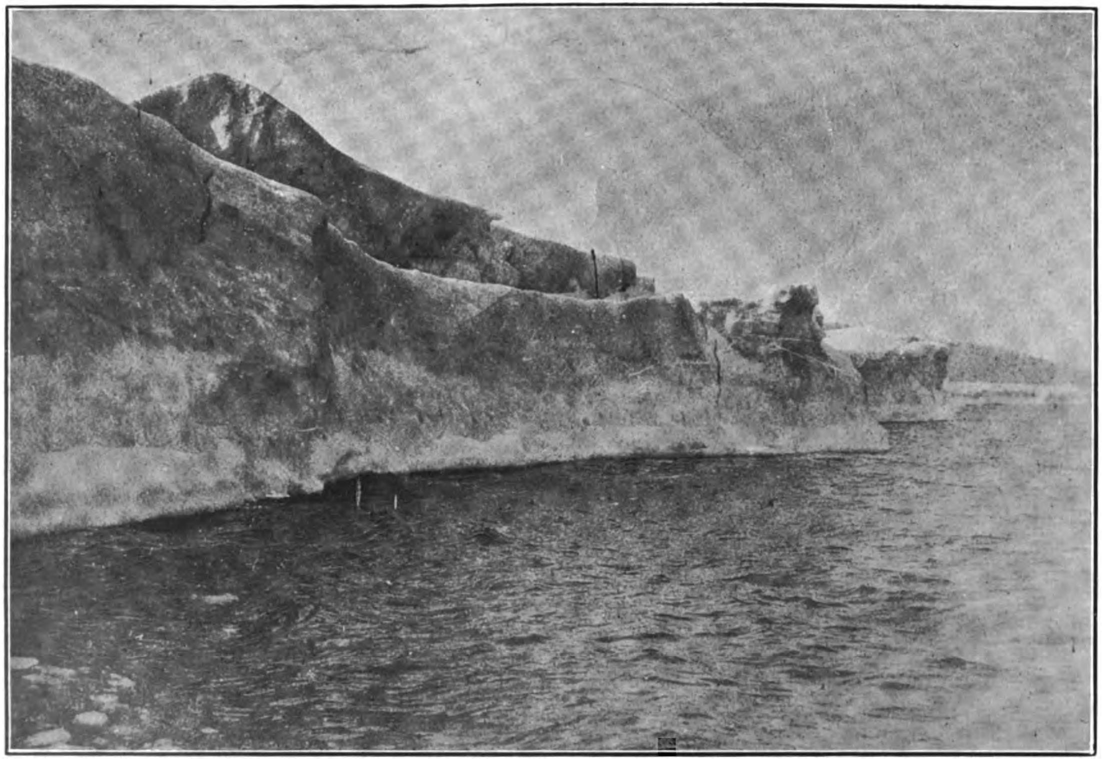
The wall or bulkhead at the outer end of the pier was damaged by storms, which made an opening 5 by 20 feet, and this has been repaired with the aid of a diver. There was a settlement of the rock filling and of the riprap at the base of the pier for a few hundred feet from the end of the pier, the rock apparently working downward into the fine sand of that locality. For refilling the vacancies in the crib 500 yards of small bowlders have been used, picked up from the beach in that locality, at a contract price of $2, or $1,000; Barney & Wigman, contractors. Repairs to the pier were made by hired labor and purchase of material, during the month of June, 1910, at a total cost of $1,940. The principal items of cost were: Services of diver, $525, who was paid at the rate of $30 per day for the first ten days and $25 per day for the remaining time. Pay was given for every day from the time of leaving Duluth until return and including stormy weather. Timber used was 15,411 feet b. m., sawed at the local harbor, for which $16 per 1,000 was paid for standard lengths of 16 feet and a higher price for lengths above 16 feet.

There were built 406 linear feet of sand fence on the west side of the channel, in extension of some fence previously built, to arrest the drifting of sand by winds and the tendency to accumulate in the channel. This fence is of cheap construction, consisting of posts picked up from the beach and cull lumber purchased at a cost of $8 per thousand feet. The cost of this fence, including labor and material, was about $60.

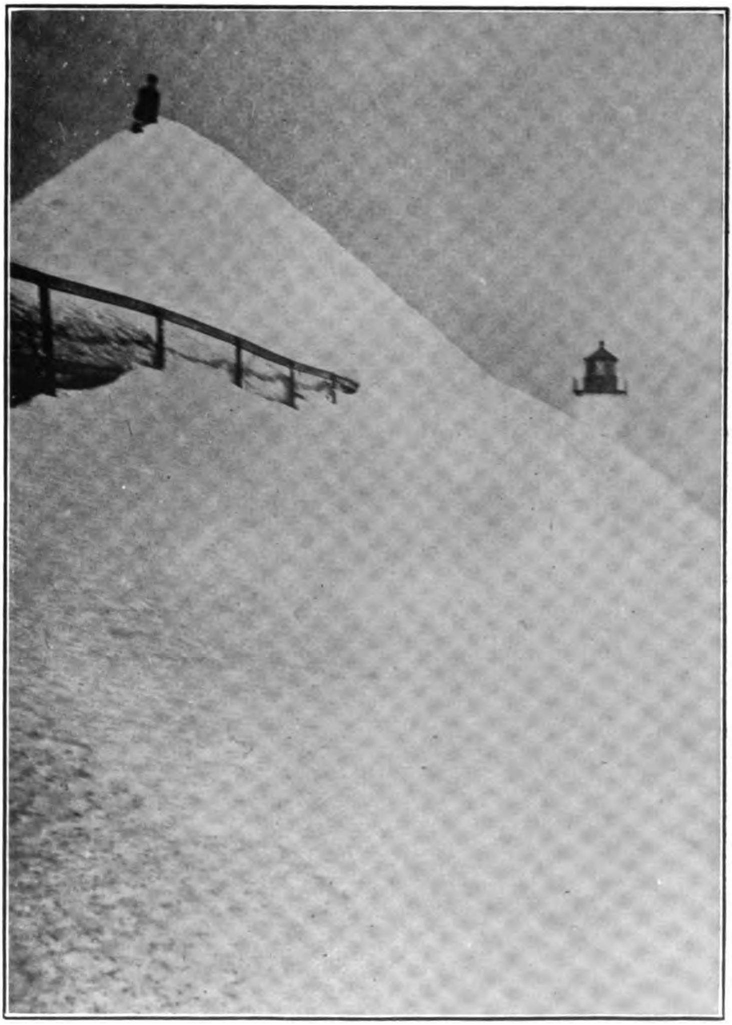
Worthiness of further improvement.—This harbor reached a maximum development of commerce about three years ago, the value of its receipts and shipments in 1907 being $2,539,780. Since then it has fallen off somewhat on account of the partial exhaustion of the pine-timber supply. In 1909 the value was $1,204,249. There is still a large business in the manufacture of hardwood lumber and other grades, and it is estimated that the local mills will cut 15,000,000 feet this year and 10,000,000 feet will be shipped by water.

The harbor is useful as a refuge, it being the only shelter in the 90-mile stretch between Whitefish Bay and South Bay, a coast much subject to shipwrecks. Quite a large number of vessels run into Grand Marais for shelter, and more would do so but for the uncertainty as to the available depth of the entrance channel.

In my opinion, the locality is worthy of further improvement by maintenance, and the dredging should be frequent enough and deep enough to provide a liberal margin for shoaling and to insure at all times the projected depth of 18 feet.



ICE FORMATION AT THE WEST ENTRANCE PIER AT HARBOR OF GRAND MARAIS, MICH., MARCH 17, 1910. LOOKING LAKEWARD.
PIER COVERED.



ICE FORMATION AT THE WEST ENTRANCE PIER AT HARBOR OF GRAND MARAIS. MICH., MARCH 17, 1910 LOOKING TOWARD HARBOR. PIER COVERED. OUTER LIGHT-HOUSE AND ELEVATED WALK ARE SEEN.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

June 14, 1880	$10,000.00
March 3, 1881	20,000.00
August 2, 1882	40,000.00
July 5, 1884	35,000.00
August 5, 1886	26,250.00
August 11, 1888	50,000.00
September 19, 1890	50,000.00
July 13, 1892	30,000.00
August 18, 1894	20,000.00
June 3, 1896	24,000.00
March 3, 1899	25,000.00
June 6, 1900 (allotted)	$384.32
June 13, 1902	70,000.00
Sale of United States property	125.00
June 13, 1902 (allotted)	5,000.00
March 3, 1905	50,000.00
March 2, 1907	30,000.00
June 25, 1910	40,000.00
Total	525,723.32

CONTRACTS IN FORCE.

Emergency contract dated May 14, 1910, with Edward Brothers Dredge Company, of Sault Ste. Marie, Mich., for dredging about $10,000 worth of shoals in front of the entrance to Grand Marais Harbor, at 22 cents per cubic yard. Work to begin June 1, 1910, and be completed July 30, 1910.

Emergency contract dated June 3, 1910, with Barney & Wigman, of Grand Marais, Mich., for about $1,000 worth of rock filling placed in the piers at Grand Marais, at $2 per cubic yard in place. Work to begin at once and be completed by June 30, 1910.

COMMERCIAL STATISTICS.

Arrivals and clearances of vessels at Grand Marais, Mich., for the calendar year 1909.

[Season of navigation opened, April 21; closed, December 12.]

Class.	American.	Total.	Net registered tonnage.
Registered:			
Steamers	692	692	102,480
Barges [a]	40	40	12,000
Total	732	732	114,480

[a] The figures here given are for tow barges. No vessels enter this harbor which depend on sails as means of navigation. All boats doing business with this harbor are registered.

Decrease in number of vessels, 142, equal to 16 per cent.

Decrease in registered tonnage, 147,720, equal to 56 per cent.

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

[Tons of 2,000 pounds.]

Receipts.	Tons.	Shipments.	Tons.
General merchandise	4,300	Lumber (15,500,000 feet)	23,250
Coal, hard and soft	4,100	Lath (6,000,000)	1,500
Fish	320	Ties (25,455)	1,400
		Wood (625 cords)	1,250
Total	8,720	General merchandise	180
		Total	27,580

Total receipts and shipments, 36,300 tons. Decrease under 1908, 8,706 tons, equal to 19 per cent.

Total valuation, $1,204,249. Decrease, $115,409, equal to 8 per cent.

Average haul, 809 miles; rate per ton-mile 0.78 mill. The average haul and rate per ton-mile are values for the commerce passing through the St. Marys Falls Canals in the year 1909, as given in the official report for that waterway, and are here taken as being approximately true for the commerce of each harbor on Lake Superior and for each commodity.

I I II.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Steamer Alex. Nimick.—For previous operations see Annual Report for 1909, Appendix I I, page 1939. No work was done during the fiscal year on this wreck. See also the last paragraph herewith.

Steamer Sevona.—See Annual Report for 1909, Appendix I I, page 1940, for previous operations on the removal of this wreck. Between the dates of June 28 and July 8, 1909, the work of removal was prosecuted by this office, with hired labor and purchase of material and with government plant consisting of a derrick scow and the steamer *Vidette.* The remaining projections above the bottom were blasted away so as to give a clear depth of 14 feet over the wreck. The cost of this work was $1,500, and was paid from the allotment of $1,500 made by the Secretary of War, under date of April 28, 1909. The bottom of the vessel remains and can not be removed except at a cost in excess of any benefit to navigation. The least depth over the rocky shoal on which the wreck lies is reported to be 17.2 feet, precluding navigation in the vicinity by large vessels, and the depth of 14 feet over the wreck is sufficient for coasting steamers, tugs, and smaller vessels. The Light-House Establishment maintains a red spar buoy at a distance to the north to mark the shoal and wreck.

Tug Quail.—While prosecuting dredging operations at Ontonagon Harbor, Michigan, in June, 1909, the submerged wreck of a vessel was encountered in the entrance channel, lying close to the west pier near the inner end, with 4 feet of water over it. This proved to be the tug *Quail*, which burned and sank some twenty or more years ago. It seems probable that the dredging of recent years undermined the wreck so that it gradually slid out toward the channel, until this year when it was struck by the dredge. The size is not known, but it was a very large wooden tug, and formed a menace to navigation.

Authority for the removal of the wreck was granted by the Secretary of War and an allotment of $1,000 made for doing the work. The work of removal was done by hired labor, government plant, and with the assistance of a dipper dredge for lifting some of the larger pieces. The work was begun in August, 1909, and completed August 14, 1909, at a total cost of $1,000. The wreckage was deposited in the lake, inshore, west of the entrance.

Other wrecks.—Authority was granted by the Secretary of War, under date of June 7, 1910, and an allotment of $4,000 made, in addition to $446 already on hand, for the removal of the following three wrecks which form an obstruction to navigation: The steamer *Manhattan*, off the easterly shore of Grand Island, near Munising, Mich.; the steamer *Alex. Nimick* (previously described); and the steamer *Chauncey Hurlbut*, off Vermilion Point, Michigan, all on the south shore of Lake Superior. Legal notice was duly given by publication, dated June 7, 1910, that unless otherwise removed within thirty days these wrecks would be removed by the United States under authority of law, also requesting sealed proposals for doing the work, to be opened July 7, 1910.

TABLE 1.—*Condensed statement of commerce, cost of improvements, cost of maintenance, etc., for the harbors of Duluth, Minn., district.*

COMMERCE AND EXPENDITURES.

Name of harbor.	Number of vessels arriving and departing.	Commerce for the calendar year 1909.				Amount expended during fiscal year ending June 30, 1910.
		Net registered tonnage.	Number of passengers.	Vessel freight received and shipped (tons of 2,000 lbs.).	Estimated value of freight.	
Grand Marais, Minn	1,270	397,510	6,000	13,285	$1,656,557	$7.90
Agate Bay, Minnesota	[a] 3,206	[b] 10,114,158	15,733	10,628,731	29,308,378	4,576.09
Duluth-Superior	[a] 13,259	[b] 35,150,934	51,423	32,529,301	261,509,159	312,017.05
Port Wing, Wis	170	22,610	(c)	29,745	447,595	4,827.75
Ashland, Wis	2,366	3,844,603	[e] 147,721	5,396,174	17,967,797	23,228.15
Ontonagon, Mich.[d]	378	137,540	(c)	16,870	325,733	19,738.72
Keweenaw Waterway [f]	1,731	1,476,712	41,091	1,271,130	32,473,796	15,150.00
Marquette, Mich.[g]	586	1,418,706	(c)	1,741,055	7,106.799	4,085.96
Marquette Bay, Michigan	466	1,517,577	(c)	1,878,129	5,696,641	....
Grand Marais, Mich	732	114,480	(c)	36,300	1,204,249	2,091.72
Total	24,164	54,194,830	....	53,540,720	357,696,704	385,723.34

[a] Tugs not included.
[b] Registered tonnage of tugs not included.
[c] Passengers not reported.
[d] Includes Washburn and Bayfield.
[e] Principally excursions carried between Ashland, Washburn and Bayfield, and the Apostle Islands.
[f] Commerce of local ports. For through commerce and local-and-through commerce, see pages 2085–2087
[g] Exclusive of Marquette Bay.

TABLE 2.—*Statement of total commerce and total expenditures from the commencement of improvements by the United States to the present time.*

Name of harbor.	Date of commencement.	Expended by the United States to June 30, 1910—			Total commerce to December 31, 1909.		Percentage ratio of total amount expended to estimated value.
		For improvement.	For maintenance.	Total expended.	Tons of 2,000 pounds.	Estimated value.	
Grand Marais, Minn	1880	$160,936.68	$5,387.74	$166,324.42	395,002	$12,272,165	1.36
Agate Bay	1887	234,057.53	21,415.34	255,472.87	95,890,902	233,820,370	.11
Duluth-Superior	1867	5,737,142.88	516,030.00	6,253,172.88	298,508,435	3,365,288,779	.18
Port Wing	1903	41,301.95	10,517.46	51,819.41	329,039	3,945,552	1.31
Ashland	1887	195,265.16	284,783.21	480,048.37	[a]79,003,424	[a]544,591,864	.09
Ontonagon	1867	284,801.24	113,216.74	398,017.98	2,824,922	75,691,250	.53
Keweenaw Waterway	1891	[b]1,299,431.39	248,357.64	1,547,789.03	[c]30,953,518	[c]1,019,776,847	.15
Marquette	1867	603,101.22	70,829.03	673,930.25	[d]26,743,032	[d]146,601,135	.46
Marquette Bay	1897	55,056.34	2,701.82	57,758.16	20,045,724	53,794,716	.11
Grand Marais, Mich	1880	355,885.29	115,186.16	471,071.45	1,472,090	25,561,553	1.84
Total	....	8,966,979.68	1,388,425.14	10,355,404.82	556,166,088	5,481,344,231	....

[a] Includes Washburn and Bayfield.
[b] Includes purchase money paid to original owners.
[c] Through and local commerce. Separate figures for local commerce have not been given prior to 1907.
[d] Exclusive of Marquette Bay.

TABLE 3.—*Saving in freight charges by water transportation.*

Table 3 is based on the following data:

	Mills.
Average freight charges by water, per ton-mile in 1909 (St. Marys Falls canals)	0.78
Probable rate by railroad per ton-mile, at least	3.00
Difference in rates per ton-mile	2.20

Average distance freight was carried, 1909 (St. Marys Falls canals), 809 miles.

Saving on each ton, 2.2 mills × 809 = $1.78.

This is taken as applying to each harbor on Lake Superior which has railroad facilities.

Name of harbor.	Vessel freight in 1909.	Saving in freight charges in 1909, at $1.78 per ton.
	Tons.	
Agate Bay	10,628,731	$18,919,141
Duluth-Superior	32,529,301	57,902,156
Ashland (exclusive of other harbors on Chequamegon Bay)	5,396,174	9,605,190
Ontonagon	16,870	30,029
Keweenaw Waterway (local ports only; does not include through commerce)	1,271,130	2,262,611
Marquette (exclusive of Marquette Bay)	1,741,055	3,099,078
Marquette Bay	1,878,129	3,343,070
Grand Marais, Mich	36,300	64,614
Total	53,497,690	95,225,889

TABLE 4.—*Annual expense in government improvements in maintenance, interest, and depreciation.*

Name of harbor.	Maintenance (repairs and administration) average per annum.	Interest on cost of improvements at 4 per cent.	Depreciation, 1 per cent or 2 per cent on cost of improvements per annum.		Annual expense (sum of last 3 columns).	Ratio of annual expense to tons of freight, to value of freight, etc.		
			Per cent.	Amount.		Annual expense per ton of freight in 1909.	Annual expense per cent of valuation of freight in 1909.	Annual expense per cent of saving in freight charges for 1909.
							Per cent.	*Per cent.*
Grand Marais, Minn.[a]	$180	$6,437	1	$1,609	$8,226	$0.62	0.49	(a)
Agate Bay	931	9,362	2	4,681	14,974	.0014	.05	0.079
Duluth-Superior	12,001	229,486	1	57,371	298,858	.0092	.11	.52
Port Wing[a]	1,502	1,652	2	826	3,980	.1338	.88	(e)
Ashland[b]	12,382	7,811	2	3,905	24,098	.0045	.13	.25
Ontonagon	2,633	11,392	2	5,696	19,721	1.17	6.05	65.67
Keweenaw Waterway	13,071	51,977	1	12,994	78,042	[c].061	[c].24	[c]3.44
Marquette	1,647	24,124	2	12,062	37,833	.0217	.53	1.22
Marquette Bay	208	2,202	2	1,101	3,511	.0018	.06	.11
Grand Marais, Mich.	[d]3,840	14,235	2	7,118	25,193	.69	2.09	38.99
Total	48,395	358,678	......	107,363	514,436	[e].0096	[e].14	[e].54

[a] No railroad.

[b] Exclusive of Washburn and Bayfield.

[c] Freight of local ports only.

[d] No repairs have yet been necessary.

[e] Average for entire district, found by taking total annual expense and the total freight, etc.

TABLE 5.—*Capacity of iron-ore docks in the Duluth, Minn., district, and shipments of ore, season of 1909 (short tons).*

Harbor and railway.	Dock No.	Length of dock.	Capacity of each dock.	Capacity for each railway.	Shipments, 1909, by each railway.	Capacity for each harbor.	Shipments, 1909, for each harbor.	Remarks.
		Feet.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	
Agate Bay (Two Harbors) Duluth and Iron Range Ry.	1	1,388	45,248	259,455	10,282,867	259,455	10,282,867	Ore dock No. 6 has a steel superstructure on concrete.
	2	1,280	46,592					
	3	1,054	38,080					
	4	1,042	41,395					
	5	1,050	39,704					
	6	920	48,436					
Duluth-Superior, Duluth, Missabe and Northern Ry.	2	2,336	77,414	301,318	15,024,811	....	....	
	3	2,304	90,317					
	4	2,304	133,587					
Great Northern Ry.	1	2,244	113,098	317,520	7,453,828	618,838	22,478,639	
	2	2,100	105,840					
	3	1,956	98,582					
Ashland, Wis., Chicago and Northwestern Ry.	1	1,404	47,174	94,348	3,390,113	....	....	
	2	1,404	47,174					
Minneapolis, St. Paul and Sault Ste. Marie Ry.	1	1,908	54,159	54,159	904,286	148,507	4,294,399	Formerly Wisconsin Central Ry.
Marquette, Mich., Duluth, South Shore and Atlantic Ry.	4	1,200	31,360	87,360	1,523,627	87,360	1,523,627	
	5	1,236	56,000					
Marquette Bay, Mich., Lake Superior and Ishpeming Ry.	1	1,232	40,320	40,320	1,734,967	40,320	1,734,967	This is also known as North Harbor, Marquette.
Totals for district.	......	....	....	....	....	1,154,480	40,314,499	

TABLE 6.—*Casualties on Lake Superior for calendar year 1909.*

Date.	Name of vessel.	Damages.			Lives lost.	Place, cause of damage, and remarks.
		Vessel.	Cargo.	Total.		
Apr. 10	America				0	One-half mile inside Victoria light. Aground. Heavy snowstorm.
15	Fred B. Hall	$800	$100	$900	0	Susie Island. Damaged by ice. Sunk. Raised by Whitney Brothers Co.
16	Hoover & Mason				0	Near Outer Island. Boiler tubes let go.
29	R. E. Schuck	4,800		4,800	0	Duluth Harbor Basin. Dragged anchor during northeast gale.
29	Perry G. Walker	4,900		4,900	0	Duluth Harbor basin. Went on bank. Plates damaged.
29	Aurania	225,000	30,000	255,000	0	Whitefish Bay. Caught in ice.
May 1	Nester (barge)	5,000		5,000	7	Huron islands. Foundered on rock in storm.
1	Superior				0	Whitefish Bay. Wheel broke by ice.
2	Prentice	250		250	0	Duluth Canal. Struck south pier.
2	Halstead				0	
3	Panay				0	Portage Canals. Grounded.
4	Ericsson	300		300	0	Whitefish Bay. Damaged by ice.
4	Adella Shores	30,000		30,000	14	Between Whitefish Point and Huron islands. Wrecked in big storm.
12	North Wind				0	Portage Canals. Lost anchor.
16	Arenac				0	Near Marquette. Sprang a leak in bad storm. Cabin smashed and belongings of crew lost.
21	J. J. Hill				0	Duluth. Collided with steamer Troy. Slight damage.
21	Troy				0	Duluth. Collided with steamer J. J. Hill. Slight damage.
27	C. W. Moore	1,000		1,000	0	Ontonagon, Mich. Struck sunken log. Shallow water. Current in river.
27	E. J. Earling	25,000		25,000	0	Madeline Island. Ran ashore in fog.
28	City of Berlin				0	One and one-half miles east of Split Rock. Ran aground in fog.
June 6	Calumet	1,500		1,500	0	Near Two Harbors. Ran aground. Five plates replaced.
19	America	3,000		3,000	0	Duluth Harbor Basin. Ran into steamer Vance.
23	L. C. Smith				0	Near Two Harbors. Ran aground in fog.
July 9	America	2,520		2,520	0	Easterly side Burlington Point. Fog. Accident due to deflection of compass.
12	John B. Cowle	275,000	20,000	295,000	15	Whitefish Point. Struck by steamer Isaac M. Scott in fog. Sank with 7,000 tons ore.
12	Isaac M. Scott	25,000		25,000	0	Whitefish Point. Collided with steamer Cowle in fog. Thirty plates replaced.
15	Sahara				0	Duluth-Superior Harbor. Grounded less than one day.
28	Edna G. (tug)	1,000		1,000	0	Two Harbors. Collided with steamer General Garretson.
Aug. 7	Geo. W. Perkins	275		275	0	St. Louis Bay, Duluth-Superior Harbor. Struck obstruction backing out of dock.
8	Pathfinder	10,000		10,000	0	Off Eagle River. Ran aground in fog. Repairs; 35 plates, wheel, rudder, and quadrant.
8	Sagamore (barge)				0	Off Eagle River in tow of Pathfinder. Forward compartment stove in.
8	D. B. Meacham	300		300	0	Two Harbors. Broke steering gear backing away from dock.
16	Alvina (yacht)				0	Isle Royal. Grounded during fog. Damage slight.
25	E. G. Maxwell	100		100	0	Superior, Wis. Broke shaft.
29	Henry Steinbrenner	3,000		3,000	0	Port Arthur. Struck obstruction. Damage to rudder and steering gear.
Sept. 1	Northern Wave				0	Whitefish Point. Fire in after hatch. Part of cargo jettisoned.
18	Livingstone	1,254		1,254	0	Duluth Harbor. Ran on bank. Trouble with steering gear.
19	M. C. Neff	18,000		18,000	0	Duluth-Superior Harbor. Burned to water's edge.
21	Samoa	40,000		40,000	0	Torch Lake. Burned to water's edge.
25	E. H. Gary	200		200	0	Lake Superior. Stannard Rock. Broke down and had to be towed to Duluth.
26	Pontiac				0	Sable Point. Struck obstruction; 2 buckets off wheel.

TABLE 6.—*Casualties on Lake Superior for calendar year 1909*—Continued.

Date.	Name of vessel.	Damages.			Lives lost.	Place, cause of damage, and remarks.
		Vessel.	Cargo.	Total.		
Sept. 27	Geo. F. Baker				0	Duluth-Superior Harbor. Struck obstruction; 4 buckets off wheel.
29	Chieftain				0	Portage Canal. Steering gear disabled; collided with revetment.
Oct. 2	Montezuma				0	Portage Canal. Aground two and one-half hours.
11	John B. Trevor	$100,000	$10,000	$110,000	0	Isle Royal. Ran ashore in snowstorm. Total loss.
16	Alex Holley	600		600	0	Whitefish Point. Collided with steamer Superior City. Slight damage.
28	Saturn				0	Lake Superior. Intermediate cylinder broken. Towed to Marquette.
Nov. 2	Scow No. 12	7,000		7,000	0	Superior Entry, Wis. Struck pier. Dumped load of rock.
5	Choctaw				0	Grand Marias, Mich. Two hatch covers broke in heavy sea.
	Centurion				0	Marquette. Lost anchor.
13	J. H. Hoyt	70,000	14,000	84,000	0	Whitefish Bay. Struck by Ward Ames. Abandoned to underwriters.
15	Paisley (barge)	250	300	550	0	Between Whitefish Bay and Keweenaw Point. Lost part of deck load of 300,000 feet lumber. Heavy 40-mile northwest gale.
15	Ottawa				0	Passage Island. Foundered. Shifting of cargo in heavy storm.
15	Odanah	15,000		15,000	0	Duluth Canal. Struck pier.
16	James S. Dunham	2,000		2,000	0	Chequamegon Point. Disabled steering gear. Stranded.
16	Joseph Selwood	750		750	0	Two Harbors. Struck by Wm. Edenborn.
16	City of Two Harbors	200	300	500	0	Near Superior Entry, Wis. Rudder became disabled. Drifted to south shore.
17	Steamer Grampian	2,500	3,000	5,500	0	40 miles west of Whitefish Point. Water logged in 60-mile gale snowstorm.
18	Bransford				0	Isle Royal. Struck rock. One compartment stove in.
23	Manola				0	Duluth-Superior Harbor. Grounded. Had to be lightered.
27	Shaughnessy				0	Isle Royal. Grounded; 22 plates damaged.
29	Ottawa (tug)	50,000		50,000	0	Bayfield, Wis. Burned to water's edge.
Dec. 5	City of Two Harbors	200		200	0	North shore Beaver Bay. Engine broke down. Drifted. Fifty-mile gale.
6	B. Lyman Smith				0	Port Arthur. Grounded. Lightered and afterwards reloaded.
7	Philip Minch				0	Lake Superior. Threw couple of buckets off her wheel.

APPENDIX JJ.

IMPROVEMENT OF RIVERS AND HARBORS IN THE MILWAUKEE, WISCONSIN, DISTRICT.

REPORT OF MAJ. CHAS. S. BROMWELL, CORPS OF ENGINEERS, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Manistique Harbor, Michigan.
2. Gladstone Harbor, Michigan.
3. Menominee Harbor and River, Michigan and Wisconsin.
4. Oconto Harbor, Wisconsin.
5. Green Bay Harbor, Wisconsin.
6. Depere Harbor, Wisconsin.
7. Sturgeon Bay and Lake Michigan Ship Canal, and harbor of refuge connected therewith, Wisconsin.
8. Operating and care of Sturgeon Bay and Lake Michigan Ship Canal, Wisconsin.
9. Algoma Harbor, Wisconsin.
10. Kewaunee Harbor, Wisconsin.
11. Two Rivers Harbor, Wisconsin.
12. Manitowac Harbor, Wisconsin.
13. Sheboygan Harbor, Wisconsin.
14. Port Washington Harbor, Wisconsin.
15. Harbor at Milwaukee, Wisconsin, including harbor of refuge.
16. Milwaukee Inner Harbor, Wisconsin.
17. Racine Harbor, Wisconsin.
18. Kenosha Harbor, Wisconsin.
19. Waukegon Harbor, Illinois.
20. Fox River, Wisconsin.
21. Operating and care of locks and dams on Fox River, Wisconsin.

United States Engineer Office,
Milwaukee, Wis., July 18, 1910.

Sir: I have the honor to transmit herewith annual report for the works of river and harbor improvement in my charge for the fiscal year ending June 30, 1910.

Very respectfully,
Chas. S. Bromwell,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

JJ 1.

IMPROVEMENT OF MANISTIQUE HARBOR, MICHIGAN.

Operations during the fiscal year.—Under contract with Greiling Brothers for building crib revetment, removing old pier, and dredging, work was in progress at the beginning of the fiscal year, and was completed November 30, 1909. During the fiscal year 375 linear feet of crib revetment was built and 300 linear feet of old pier removed. The total amount dredged under the contract was 81,305 cubic yards, of which 66,738 cubic yards was dredged during the fiscal year. The contract price of this dredging was 19 cents per cubic yard.

Condition of the improvement.—Soundings completed May 6, 1910, showed an entrance channel about 350 feet wide with a minimum depth of about 16 feet below datum near center of channel and westerly of the crib revetment.

The funds available are believed to be sufficient for building about 1,080 feet of the west pier, for extending the breakwater about 400 feet, and for a limited amount of dredging. It is proposed to do no more dredging than is necessary to maintain a depth of about 16 feet. It would be useless to attempt to obtain the full project depth of 19 feet over the entire area to be dredged until the west pier has been completed and the east pier built. The interests of commerce demand that the full project depth should be obtained as soon as possible. It is therefore not only desirable but very necessary that the balance of the estimate remaining unappropriated and amounting to $138,462 be made available.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $138,462
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Total to March 3, 1881 (H. Doc. No. 421, 57th Cong., 2d sess., p. 275)	$6,000
March 3, 1905	25,000
March 2, 1907	25,000
June 25, 1910	150,000
Total	206,000

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 1, 1909; closed November 30, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	265	265	248,757	28
Unrigged and sailing	37	37	13,453	
Total	302	302	262,210	28

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.					
[Car ferry shipments not included.					
				Miles.	
Fish	46,940 pounds	23	$1,600	370	$0.00557
Lath	4,844,400	1,700	9,700	280	.00335
Lumber	34,140,454 feet b. m	59,750	631,600	509	.00192
Merchandise, general		18	2,700	220	.0185
Peas, dried	9,383 bushels	282	18,700	156	.0183
Potatoes	35 bushels	1	20	66	.0379
Pig iron	8,526 gross tons	9,539	153,500	650	.00096
[Via car ferries.]					
Agricultural implements	500,000 pounds	250	25,000	93	.00673
Bark, tan	600 cords	690	6,300	93	.00673
Butter	160,000 pounds	80	35,000	93	.00448
Cattle	100	30	3,500	93	.00807
Coal		98	350	93	.00323
Corn	1,344 bushels	37	870	93	.00278
Eggs	43,200 dozen	40	8,200	93	.00807
Fish	80,000 pounds	40	2,000	93	.00448
Flour	19,940 barrels	1,994	112,000	93	.00403
Hay		255	3,000	93	.00537
Hides	480,000 pounds	240	52,800	93	.00448
Iron and steel	69,326,000 pounds	34,663	2,600,000	93	.00448
Lath	9,120,000	3,200	32,000	93	.00474
Leather	400,000 pounds	200	76,000	93	.00673
Lime and cement	12,525 barrels	1,880	18,800	93	.00448
Lumber	16,259,500 feet b. m	28,400	293,000	93	.00474
Merchandise, general		6,378	800,000	93	.00733
Mill stuffs		4,690	84,500	93	.00462
Oats	1,100 bushels	18	500	93	.00403
Oil	900 barrels	200	9,000	93	.00448
Plaster, land		400	2,400	93	.00403
Poles, telegraph	39,750	6,000	60,000	93	.00474
Posts, fence	111,600	2,100	9,000	93	.00474
Potatoes	3,500 bushels	105	2,300	93	.00403
Salt	1,600 barrels	240	1,200	93	.00403
Saw logs	220,000 feet b. m	440	2,000	93	.00448
Shingles	95,200,000	16,600	238,000	93	.00475
Stone	100 cords	550	800	93	.00323
Ties, railroad	74,250	5,000	26,000	93	.00475
Wheat	2,400 bushels	72	2,600	93	.00269
Total		186,203	5,324,940		
IMPORTS.					
Car ferry shipments not included.]					
Agricultural implements	7,800 pounds	4	600	135	.0259
Barley	55 bushels	1	37	135	.0148
Beans	156 bushels	4	360	135	.0259
Coal, hard		1,360	8,160	650	.00092
Coal, soft		1,367	4,440	460	.00131
Corn	489 bushels	13	290	135	.0148
Flour	514 barrels	51	2,850	135	.0148
Hay		1	15	135	.0148
Iron and steel	37,050 pounds	18	1,400	391	.00921
Merchandise, general		390	58,500	133	.02632
Mill stuffs		15	330	138	.0145
Oats	745 bushels	12	350	135	.0148
Oil	13 barrels	3	125	310	.0213
Peas, dried	2,197 bushels	66	4,400	103	.0339
Potatoes	62 bushels	2	45	135	.0185
Salt	178 barrels	27	160	120	.0125
Tar	15 barrels	3	70	100	.016
Wheat	334 bushels	10	370	138	.0145
[Via car ferries]					
Agricultural implements	3,080,000 pounds	1,540	154,000	93	.00673
Apples	3,520 barrels	260	7,900	93	.00673
Brick	240,000	500	1,250	93	.00403
Cattle	175	53	6,000	93	.00807
Coal		50,954	178,000	93	.003
Flour	1,350 barrels	135	7,500	93	.00403

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
IMPORTS—continued.					
[Via car ferries]—Continued.				*Miles.*	
Hay		15	$180	93	$0.00537
Hides	2,240,000 pounds	1,120	246,000	93	.00448
Iron and steel	2,610,000 pounds	1,305	98,000	93	.00448
Lath	100,000	56	560	93	.00474
Lime and cement	525 barrels	79	800	93	.00448
Lumber	319,000 feet b. m.	500	6,400	93	.00474
Merchandise, general		5,292	660,000	93	.00733
Mill stuffs		90	1,600	93	.00462
Oil	1,350 barrels	305	14,000	93	.00448
Plaster, land		20	120	93	.00403
Posts, fence	1,200	23	100	93	.00474
Provisions	300,000 pounds	180	32,400	93	.00403
Salt	43,000 pounds	6,540	32,700	93	.00357
Shingles	320,000	56	800	93	.00538
Wooden ware	6,600 pieces	25	1,500	93	.00538
Total		72,455	1,532,372		
Total exports and imports		258,658	6,857,312		

NOTE.—All of the above "rates per ton-mile" for the car-ferry business are based on a fixed charge of $7.50 per car, which amount is the allowance made to the ferries for transferring each loaded car from one lake port to the other. The above allowance is independent of the contents of the car and was established by the railroads to comply with a request of the Interstate Commerce Commission.

JJ 2.

IMPROVEMENT OF GLADSTONE HARBOR, MICHIGAN.

Operations during the fiscal year.—No work has been in progress.

Condition of the improvement.—Soundings completed January 9, 1907, indicate that no material shoaling has occurred over the area dredged in 1905.

Remarks.—The funds available are believed to be sufficient for maintenance until June 30, 1912; therefore no appropriation is recommended at the present time.

APPROPRIATION.

March 3, 1905	$14,000

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 20, 1909; closed December 5, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.
Registered:			
Steamers	218	218	155,684
Sailing	19	19	14,326
Total	237	237	170,010

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Barley	731,783 bushels	17,563	$439,000	704	$0.000738
Canned goods		875	70,000	704	.00199
Cooperage		3,500	70,000	704	.00241
Cream of wheat		1,410	170,000	704	.00207
Flour	1,340,386 barrels	134,039	7,372,000	627	.00159
Hides	50,000 pounds	25	5,500	704	.00341
Iron, pig	20,263 gross tons	22,695	364,700	704	.00104
Lumber	1,200,000 feet b. m	2,100	21,600	283	.00333
Merchandise, general		113	17,000	704	.00426
Oats	1,745,129 bushels	27,992	785,300	704	.00111
Oil cake		224	7,200	704	.00142
Peas, dried	450 bushels	13	900	704	.00114
Rye	77,495 bushels	2,170	57,700	704	.00063
Shingles	27,180,000	4,080	68,000	704	.00241
Wheat	43,202 bushels	1,296	47,500	704	.00059
Wool	150,000 pounds	75	33,000	704	.00341
Total		218,170	9,629,400		
IMPORTS.					
Coal, hard		5,517	34,500	704	.0005
Coal, soft		146,832	469,800	572	.00061
Merchandise, general		84,414	12,662,000	704	.00284
Posts, fence	296,467	5,930	29,000	107	.00794
Rails	5,516 gross tons	6,178	154,500	704	.00213
Salt	17,793 barrels	2,670	13,350	400	.00263
Ties, railroad	3,853	270	17,000	45	.016
Total		251,811	13,380,150		
Total exports and imports		469,981	22,909,550		

JJ 3.

IMPROVEMENT OF MENOMINEE HARBOR AND RIVER, MICHIGAN AND WISCONSIN.

Operations during the fiscal year.—Dredging for restoration of channel was begun August 17 and completed September 17, 1909. The work was done by the government dredge, and 26,014 cubic yards was removed, at a cost of 12.1 cents per cubic yard.

Condition of the improvement.—Soundings completed May 11, 1910, showed an entrance channel about 300 feet wide to the inner end of the piers, thence to Ogden Street Bridge a width of about 170 feet. The channel generally has a depth of 20 feet below datum, except for a few small shoals.

A portion of the superstructure of the north pier is in bad condition and requires rebuilding above the water surface. Repairs to the south pier are also needed, and dredging for maintenance of channel will be required. It is believed that the balance available is sufficient for doing the work above outlined and for maintenance of this harbor until June 30, 1912; therefore no appropriation is recommended.

APPROPRIATIONS.

Total to March 3, 1899 (H. Doc. No. 421, 57th Cong., 2d sess., p. 343):		
Harbor	$234, 650. 00	
River	114, 420. 00	
		$349, 070. 00
June 13, 1902, harbor and river		50, 350. 00
March 2, 1907, harbor and river		5, 000. 00
March 3, 1909, harbor and river (allotment for preservation and maintenance, March 27, 1909)		4, 000. 00
June 25, 1910		10, 000. 00
Miscellaneous receipts credited to appropriations		3, 514. 17
Total		421, 934. 17

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

PORT OF MENOMINEE, MICH.

Season of navigation.—Opened April 19, 1909; closed December 18, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	493	2	495		[a] 2,864
Sailing	144	1	145		
Total	637	3	640	196,407	2,864

[a] Close estimate.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.					
[Car ferry shipments not included.]				*Miles.*	
Barrels, empty, half	4,325	54	$1,080	30	$0.08
Gasoline	23 barrels	6	115	30	.0667
Hay		61	730	50	.02
Lumber	13,976,000 feet b. m.	24,460	266,000	440	.0025
Poles, telegraph	225	38	450	45	.0222
Salt	630 barrels	95	475	35	.0193
Shingles	859,000	129	1,700	42	.024
Wood	126 cords	220	700	130	.0076
Miscellaneous		565	70,000	60	.067
[Via car ferries.]					
Cars, loaded	1,176	30,000	[a] 294,000	81	.0037
Lumber	2,380,000 feet b. m.	4,200	45,000	81	.0037
Ore, iron	5,619 gross tons	6,293	23,000	81	.0037
Miscellaneous		3,675	[a] 36,750	81	.0037
Total		69,796	740,000		

[a] Rough estimate.

Freight traffic—Continued.

Article	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
IMPORTS.					
[Car ferry receipts not included.]				*Miles.*	
Coal		16,083	$62,500	610	$0.0009
Fish, salt	2,893 half barrels	220	7,000	35	.037
Fruit	2,794 packages	35	4,900	23	.174
Hay		1,367	16,400	45	.028
Lumber	2,931,000 feet b. m	5,100	70,000	59	.0122
Poles, telegraph	16,011	270	32,000	144	.0069
Posts, fence	819,572	16,400	65,500	86	.0117
Shingles	1,301,000	200	2,600	31	.03222
Stone		5,075	6,300	23	.0152
Sugar beets		333	1,900	30	.0333
Ties, railroad	17,034	1,100	6,000	165	.0055
Vinegar	450 barrels	110	4,500	80	.0175
Wood	320 cords	560	1,750	88	.0086
Miscellaneous		1,563	195.000	230	.0152
[Via car ferries.]					
Coal, hard and soft (about 90 per cent soft)		50,290	200,000	81	.0037
Copper		83	21,200	81	.0037
Iron, manufactured		1,703	127,700	81	.0037
Salt	2,022 tons	2,022	10,000	81	.0037
Miscellaneous		19,418	194,000	81	.0037
Total		121,932	1,029,250		
Total exports and imports		191,728	1,769,250		

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

PORT OF MARINETTE, WIS.

Season of navigation.—Opened April 19, 1909; closed December 18, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	63	63	16,740	[a] 3,000
Sailing	104	104	12,192	
Total	167	167	28,932	3,000

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[a] Close estimate.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Barrels, empty, half	15,355	190	$3,000	30	$0.08
Coal		750	3,500	31	.0259
Fish, salt	250 half barrels	19	560	230	.0087
Flour	45 barrels	5	250	30	.0667
Hay		35	425	45	.0222
Lath	1,585,000	555	5,500	40	.018
Lumber	32,350,000 feet b. m.	56,500	815,000	322	.0084
Miscellaneous		2,167	275,000	60	.073
Oil, gasoline	65 barrels	16	300	30	.067
Poles, telegraph	100	17	200	57	.0281
Posts, fence	1,000	20	100	23	.0435
Pickets	379,854	570	5,500	150	.0073
Salt	4,260 barrels	640	3,200	30	.067
Shingles	356,000	53	700	60	.0167
Ties, railroad	4,000	270	1,200	195	.0077
Wood	235 cords	410	1,400	134	.0059
Total		62,217	1,115,835		
IMPORTS.					
Apples	825 bushels	21	650	25	.08
Barrels, empty, half	7,100	90	1,400	50	.048
Butter	18,200 pounds	9	4,000	25	.20
Coal		9,335	40,000	663	.00072
Eggs	11,210 dozen	10	2,000	35	.114
Fish, salt	43,000 half barrels	3,220	112,000	35	.037
Fish, fresh		150	24,000	8	(a)
Hay		2,181	26,000	25	.04
Lumber	5,173,000 feet b. m.	9,100	109,000	94	.0086
Merchandise, general		15,026	1,875,000	230	.0148
Poles, telegraph	2,000	340	4,000	67	.0134
Posts, fence	201,595	4,000	20,000	85	.0118
Potatoes	300 bushels	9	225	35	.057
Salt	5,815 barrels	872	4,360	95	.0071
Scrap iron	572,000 pounds	286	5,500	40	.05
Shingles	2,325,000	350	4,700	30	.033
Stone	3,680 cords	20,000	25,000	23	.0152
Ties	2,433	164	850	172	.0058
Vinegar	310 barrels	62	3,000	85	.0188
Wood	390 cords	680	2,000	92	.0091
Total		65,905	2,263,685		
Total exports and imports		128,122	3,379,520		

[a] Local catch; no rate.

JJ 4.

IMPROVEMENT OF OCONTO HARBOR, WISCONSIN.

Operations during the fiscal year.—There were no operations.

Condition of the improvement.—A survey made September 9 to October 1, 1909, indicated that there was an entrance channel, with a minimum depth of about 6 feet below datum, extending from the outer end of the south pier to a point about 2,000 feet up the river from the shore end of the piers.

A report on survey, as provided by river and harbor act approved March 3, 1909, was submitted on November 12, 1909. The estimated cost of the improvement of the harbor under the plans set forth in said report was $75,000.

The funds available are sufficient for completing this project, and as one of the conditions of said project is that the city of Oconto shall maintain the depth in all channels that shall be dredged by the United States for a period of five years in a manner satisfactory to the Secretary of War, no estimate for maintenance is submitted.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 330)	$96,000.00
July 15, 1909, returned to Treasurer of United States (Sec. 10, sundry civil act Mar. 4, 1909)	3,269.35
	92,730.65
June 25, 1910	75,000.00
Total	167,730.65

COMMERCIAL STATISTICS.

There is no commerce at the present time by way of the harbor.

J J 5.

IMPROVEMENT OF GREEN BAY HARBOR, WISCONSIN.

Operations during the fiscal year.—Dredging for restoration of the inner channel in the Fox River, below Depere, was begun July 1 and completed August 16, 1909. The work was done by the government dredging plant, and 64,294 cubic yards was removed, at a cost of 7.2 cents per cubic yard.

As numerous shoals had formed in the outer channel, extending from the mouth of Fox River to Tail Point Light, which seriously obstructed navigation, an emergency contract was entered into with Greiling Brothers Company for dredging. The available balance being insufficient for restoring the channel, an allotment of $9,000 was made from the appropriation "Emergencies in river and harbor works." Dredging under this contract was begun May 22, 1910, and is in progress at the close of the fiscal year, 30,391 cubic yards having been removed, at a cost of 16.9 cents per cubic yard.

Condition of the improvement.—The outer channel is now in fair condition, although there are still several shoals with depths of 19 feet below datum over them. It is expected that the dredging now in progress will remove these shoals. The inner channel is now in fair condition, although there are numerous shoals with less than 17 feet below datum over them.

The funds available are sufficient for the restoration and maintenance of both the inner and outer channels, including repairs at Grassy Island until June 30, 1912; therefore no appropriation is recommended.

APPROPRIATIONS.

Total to March 3, 1899 (H. Doc. No. 421, 57th Cong., 2d sess., p. 328)	$406,150.00
June 13, 1902	105,600.00
June 13, 1902 (allotment from emergencies, river and harbor, Apr. 8, 1904)	2,328.39
March 3, 1905	10,000.00
March 2, 1907	5,000.00
March 3, 1909 (allotment for preservation and maintenance, Mar. 27, 1909)	12,000.00
March 3, 1909 (allotment from emergencies in river and harbor works, Apr. 12, 1910)	9,000.00
June 25, 1910	20,000.00
Miscellaneous receipts credited to appropriation	52.50
Total	570,130.89

CONTRACT IN FORCE.

For dredging approximately 62,500 cubic yards of material, Green Bay Harbor, Wisconsin, at 16.9 cents per cubic yard.

Name of contractor: Greiling Brothers Company.
Date of emergency contract: May 2, 1910.
Date of commencement: May 12, 1910.
Date of completion: August 1, 1910.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 21, 1909; closed December 13, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	975	975	395,949	[a] 9,400
Sailing	29	29	11,655	
Total	1,004	1,004	407,604	9,400

[a] 8,000 made short excursion trips out of Green Bay and return.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Barley	445,000 bushels	10,680	$290,000	765	$0.00082
Barrels, empty, half	900	9	225	60	.05
Beer	950 cases	34	1,000	44	.0455
Brick	21,000	42	150	60	.025
Cement		1,640	15,200	60	.0167
Coal, hard		9,554	57,000	50	.01
Coal, soft		36,112	108,000	50	.01
Corn	73,200 bushels	2,050	47,500	765	.000818
Flour		3,542	212,000	685	.00175
Hay		285	3,400	50	.02
Horses	20	12	2,000	60	.0667
Lumber	464,000 feet b. m.	810	9,000	55	.0136
Machinery		120	15,000	60	.0583
Malt	1,025 bushels	17	700	765	.00043
Millstuffs		2,567	46,000	765	.00157
Mineral water		20	400	75	.0333
Oats	58,550 bushels	936	26,300	765	.00092
Oil	8 barrels	2	150	60	.05
Peas, dried		2,544	170,000	765	.00131
Pickles	1,086 barrels	195	16,300	150	.02
Rye	100,060 bushels	2,800	74,500	765	.007
Salt		45	250	60	.0333
Vegetables, canned		36	2,000	765	.00288
Wool		29	12,750	765	.00314
Miscellaneous		6,610	825,000	200	.0250
Total		80,691	1,934,825		
IMPORTS.					
Apples	832 barrels	63	1,900	140	.0119
Barley	128 bushels	3	80	50	.0166
Barrels, empty, half	276	3	70	49	.0572
Cement		9,250	78,500	515	.0019
Cheese		136	38,000	40	.05
Coal, hard		94,652	530,000	747	.00054
Coal, soft		371,498	1,110,000	615	.00057
Cord wood	102 cords	204	560	110	.0064
Farm products		20	7,500	50	.06
Fish, fresh		582	93,000	60	.10
Fish, salt	3,115 packages	310	18,000	60	.025
Hay		396	4,750	45	.0222
Horses	5	3	600	44	.102
Logs	2,000,000 feet	4,000	18,000	86	.00872
Lumber	151,000 feet b. m.	260	3,000	110	.00777
Manufactured iron		6,053	4,500	596	.00335
Oats	128 bushels	2	60	50	.025
Peaches	513 bushels	15	650	100	.018
Peas, dried	2,117 bushels	65	4,250	60	.0233
Poles	900	150	1,500	110	.00726
Potatoes	5,100 bushels	156	3,300	60	.0333
Pulp wood	48,622 cords	97,244	390,000	120	.00633
Rye	7,312 bushels	205	5,250	50	.0143
Salt		5,091	23,800	200	.00555
Scrap iron		28	500	50	.04
Stone	969 cords	5,300	6,400	43	.00815
Sugar		1,808	190,000	765	.00262
Tin plate		135	14,000	765	.00209
Vinegar	135 barrels	30	560	270	.00756
Wheat	123 bushels	4	135	50	.0134
Wool	5,600 pounds	3	1,200	50	.02
Miscellaneous		7,953	100,000	200	.025
Total		605,622	2,650,065		
Total exports and imports		686,313	4,584,890		

The above amounts include the receipts for the port of Depere, Wis. Boats out of Depere must clear at this port.

JJ 6.

IMPROVEMENT OF DEPERE HARBOR, WISCONSIN.

Operations during the fiscal year.—There were no operations except making a survey and preparation of plans and estimate.

Condition of the improvement.—Soundings completed February 1, 1910, showed that the depths of water are practically the same as those indicated on map accompanying report on the survey, which was published in House Document No. 522, Sixty-first Congress, second session.

The funds available are sufficient for completing the approved project and for maintenance of same until June 30, 1912. Therefore no estimate is submitted.

APPROPRIATION.

June 25, 1910	$11,500

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 21, 1909; closed November 29, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	104	104	50,451	[a] 100
Barge and sailing	6	6	2,811	
Total	110	110	53,262	100

[a] Estimated.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Coal		96	$300	30	$0.0167
Flour, mill stuffs, and grain		1,597	59,000	100	.02
Hay		88	1,050	53	.0189
Horses and cattle	26	10	2,000	75	.0367
Merchandise, general		1,274	160,000	100	.032
Salt	10 barrels	1	8	30	.0233
Total		3,065	222,358		
IMPORTS.					
Coal		23,980	86,075	635	.00102
Cement	23,900 sacks	1,124	10,100	167	.00539
Merchandise, general		44	6,600	100	.032
Salt	1,215 barrels	182	910	112	.00565
Sugar	127,100 pounds	63	6,700	752	.00282
Total		25,393	110,385		
Total exports and imports		28,458	332,743		

JJ 7.

IMPROVEMENT OF STURGEON BAY AND LAKE MICHIGAN SHIP CANAL AND HARBOR OF REFUGE CONNECTED THEREWITH, WISCONSIN.

Operations during the fiscal year.—Dredging for completion of channel in the vicinity of Hills Point was begun September 18 and completed October 2, 1909. The work was done by the government dredging plant, and 9,190 cubic yards was removed at a cost of 12½ cents per cubic yard.

Condition of the improvement.—The entire channel has been dredged to the full project depth, and the canal proper has been revetted for its entire length.

The act of March 3, 1905, directed the Secretary of War to determine whether for the completion of the project it was necessary to make any change in the bridge across Sturgeon Bay, and, if so, whether and to what extent the owners thereof had acquired vested or other rights in its present location so as to entitle them to damages by such change; and should he determine such change was necessary to complete the project, and that the owners had acquired vested or other rights in the present location of the bridge, he was authorized to acquire such property as might be necessary, and the sum of $50,000, or so much thereof as might be necessary, was appropriated for that purpose.

The act of March 2, 1907, provided that $20,000 of the aforesaid $50,000 might be expended for the maintenance of canal and harbor of refuge, including dredging near Hills Point. This amount has been expended and the project depth obtained. Therefore no appropriation is recommended.

As the channel through the bridge and in the vicinity of Hills Point has now been dredged to its full width and depth, and as it appears there are no vested or other rights to be acquired, it is recommended that such action be taken as may be necessary to return to the Treasury the $30,000 remaining from the appropriation of March 3, 1905.

The westerly 1,000 feet of the canal has a width of 250 feet and is provided with mooring piles on each side. This portion of the canal is used by vessels seeking refuge from storms on Lake Michigan. A vessel coming in from Lake Michigan for refuge must necessarily be turned before resuming its voyage. The present channels are insufficient to permit of turning a vessel more than 225 feet in length. As refuge in the canal is now being sought by many vessels, especially during the spring and fall, a suitable turning basin should be provided at the westerly end of the canal proper. Under existing conditions vessels longer than 225 feet are obliged to proceed down Sturgeon Bay to a point nearly opposite the city of Sturgeon Bay, a distance of about 4 miles, in order to turn.

APPROPRIATIONS.

Total to March 3, 1899 (H. Doc. No. 421, 57th Cong., 2d sess., p. 331):	
Canal	$166,833.00
Harbor of refuge	188,500.00
	355,333.00

Canal and harbor of refuge.

June 13, 1902	$44,000.00
March 3, 1903	178,000.00
March 3, 1905	50,000.00
Miscellaneous receipts credited to appropriations	12,129.40
Total	639,462.40

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 4, 1909; closed December 22, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:[a]					
Steamers	1,395	1	1,396	967,914	19,149
Sailing	931	....	931	464,071	....
Total	2,326	1	2,327	1,431,985	19,149

[a] No unregistered craft, except small gasoline fish boats, yachts, and launches, and small sail yachts, passed through the canal during the year, and no record has been kept of the number or tonnage of this class of craft.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	
Cement	9,043 tons	9,043	$76,865.50	361	$0.00427
Coal	157,776 tons	157,776	709,992.00	360	.00376
Grain	176,264 bushels	5,288	335,660.00	467	.00279
Iron, manufactured	12,672 tons	12,672	1,045,440.00	260	.0046
Iron, ore	39,701 tons	39,701	138,953.50	290	.00207
Iron, pig	4,340 tons	4,340	80,290.00	290	.00468
Lumber	124,467,000 feet b. m.	186,702	3,734,010.00	250	.00605
Merchandise, general	57,217 tons	57,217	10,012,975.00	260	.0072
Paper	1,570 tons	1,570	82,210.00	92	.0069
Poles, telegraph	122,140 pieces	20,764	500,774.00	260	.0061
Posts, paving	168,000 pieces	3,192	42,000.00	260	.0061
Salt	111,578 barrels	16,736	94,841.30	165	.00364
Stone, crib	174,906 tons	174,906	214,102.50	120	.005
Ties, railroad	241,100 pieces	16,877	84,385.00	280	.00515
Wood	8,532 cords	20,578	59,724.00	230	.00496
Miscellaneous	14,350 tons	14,350	713,762.10	260	.00615
Total	....	741,712	17,926,984.90	....	....

J J 8.

OPERATING AND CARE OF STURGEON BAY AND LAKE MICHIGAN SHIP CANAL, WISCONSIN.

Operations during the fiscal year.—Operations have been confined to work incident to operating and care, examinations, keeping record of the vessels and tonnage passing through the canal, making necessary repairs to buildings, revetments, and floating plant, and maintenance of channel.

Dredging for restoration of channel where shoaling had occurred was begun October 3 and completed November 20, 1909. The work was done by the government dredging plant, and 32,332 cubic yards was removed at a cost of 12½ cents per cubic yard.

Condition of the improvement.—Soundings in the canal proper completed March 30, 1910, indicated that the channel had the required depth of 21 feet below datum with a minimum width of about 120 feet. In the entrance channel there is a depth of 21 feet with a minimum width of about 100 feet at a point about 500 feet west of the ends of the piers. From the westerly end of the canal to Green Bay there is a channel with a minimum width of 200 feet, through which a draft of about 18 feet can be carried at the present stage of water.

Proposed operations.—It is proposed to apply the funds for which an allotment is requested in maintenance, operating and care, and supervision of existing works.

In accordance with the provisions of section 4 of river and harbor act of July 5, 1884, a summary of expenditures is herewith given.

Expenditures under permanent indefinite appropriation provided by act of July 5, 1884, for operating and keeping in repair canals and other public works.

Total expenditures to June 30, 1902 (H. Doc. No. 421, 57th Cong., 1st sess., p. 331)	$181, 974. 20
Fiscal year ending June 30—	
1903	7, 345. 15
1904	16, 970. 77
1905	6, 965. 43
1906	12, 994. 53
1907	23, 909. 19
1908	30, 077. 13
1909	18, 496. 66
1910	24, 738. 13
Total	323, 471. 19

Summary of expenditures made from appropriation for operating and care of canals and other works of navigation (indefinite), act of July 5, 1884, applied to Sturgeon Bay and Lake Michigan Ship Canal, Wisconsin, during the fiscal year ending June 30, 1910.

Services	$16, 191. 61
Supplies	3, 334. 27
Materials	4, 402. 61
Miscellaneous	809. 64
Total	24, 738. 13

JJ 9.

IMPROVEMENT OF ALGOMA HARBOR, WISCONSIN.

Operations during the fiscal year.—Under a contract with Thomas H. Smith for furnishing stone for riprapping piers and breakwater, 1,106 tons of stone was delivered during the fiscal year and the contract closed. That portion of the breakwater built with concrete caissons having suffered damage by the action of ice the superstructure was extended so as to cover the entire caissons. This work was done by hired labor and use of government plant.

Condition of the improvement.—The project for the improvement of this harbor is now completed. There is a depth of about 16½ feet below datum in channel and basin.

The piers and breakwater are now in good condition and the balance available is sufficient for maintenance of the harbor to June 30, 1912. Therefore no appropriation is recommended.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 327)	$206,000.00
March 2, 1907	43,000.00
May 27, 1908	100,000.00
Miscellaneous receipts credited to appropriations	321.55
Total	349,321.55

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 1, 1909; closed December 31, 1909. No record kept of arrivals and departures of vessels.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Apples	160 barrels	12	$360	175	$0.0297
Butter, cheese, and eggs[a]		2,475	861,000	167	.02495
Flax and clover seed	3,198 bushels	95	12,400	115	.0313
Furniture		360	36,000	148	.0541
Hay		3,000	30,000	80	.0175
Hides	70,000 pounds	35	7,700	40	.08
Horses	25	15	3,000	123	.0748
Peas, canned[b]	21,530 cases	463	37,600	130	.0142
Peas, dried[b]	7,200 bushels	216	14,400	124	.0147
Potatoes	600 bushels	18	300	175	.0297
Wood veneer and seating		900	72,000	159	.0214
Total		7,589	1,074,820		
IMPORTS.					
Coal, hard		1,200	6,720	725	.00055
Fish, fresh		210	33,600	5	(c)
Glue	156,000 pounds	78	17,000	115	.0261
Lath	750,000	225	2,600	60	.0133
Lumber	1,250,000 feet b. m	2,187	23,750	55	.0129
Merchandise, general		861	129,000	122	.0382
Shingles	900,000	135	2,250	55	.0129
Slabs	350 cords	525	1,200	55	.0151
Vinegar	75 barrels	14	750	40	.0312
Wood	800 cords	1,800	3,200	50	.0134
Total		7,235	220,070		
Total exports and imports		14,824	1,294,890		

[a] By rail and lake; about one-third by lake.
[b] Through freight; proportional rate.
[c] Local catch; no rate.

J J 10.

IMPROVEMENT OF KEWAUNEE HARBOR, WISCONSIN.

Operations during the fiscal year.—Dredging for restoration of channel was begun March 31 and completed April 14, 1910. The work was done by government dredging plant, and 16,218 cubic yards was removed at a cost of 8.8 cents per cubic yard.

As Kewaunee has become the main depot for plant and materials in this district and as the government plant is laid up and repaired at this place during the winter, a small machine shop equipped with planer, lathe, and drill press has been erected. A dwelling for custodian has also been built. The cost of machine shop and custodian's dwelling, together with repairs of plant, has been defrayed from various appropriations.

Condition of the improvement.—Soundings completed May 16, 1910, showed a channel with a minimum width of about 125 feet and with a depth of 16 feet below datum except for a few shoal spots.

The superstructure of portions of the harbor piers is in a very dilapidated condition. The funds available are sufficient to rebuild so much of the superstructure of the south pier as is immediately necessary. About 800 feet of the north pier should be cut down to the water surface and a new superstructure built thereon. Additional riprap along portions of the piers is needed, as well as additional stone in the piers themselves.

The following estimate is submitted:

For rebuilding 800 feet of superstructure (north pier), at $15	$12,000
For 2,500 tons stone (riprap and pier filling), at $1.30	3,250
For minor repairs to piers	750
For contingencies, superintendence, etc	2,000
Total	18,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $18,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 329)	$169,800.00
March 3, 1905	3,000.00
March 2, 1907	5,000.00
March 3, 1909 (allotment for preservation and maintenance, Mar. 26, 1909)	5,000.00
June 25, 1910	60,000.00
Miscellaneous receipts credited to appropriations	491.69
Total	243,291.69

Appropriated by local authorities in 1881 and expended by the United States under the direction of the engineer officer in charge, $8,042.72.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 1, 1909; closed December 31, 1909.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	414	362,349	[a] 500
Sailing	13	707	....
Total	427	363,056	500

[a] Estimated.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Barley	315,056 bushels	75,601	$49,000	64	$0.00434
Butter	125,000 pounds	63	28,000	102	.0392
Cheese	1,500,000 pounds	750	210,000	185	.0144
Coal, soft		166	550	64	.00391
Corn	2,000 bushels	56	1,300	64	.00403
Eggs	3,000 cases	83	17,000	102	.0392
Flour		1,532	86,000	64	.00418
Hay		929	11,000	100	.0107
Hides	2,000 bales	200	22,000	29	.0207
Iron and steel		85	6,300	64	.0059
Lumber	3,175,000 feet b. m.	5,570	57,000	64	.00468
Malt	2,401 pounds	1	50	64	.00434
Merchandise, general		24,134	3,000,000	116	.0258
Mill stuffs		337	6,000	64	.00651
Oats	165,050 bushels	2,640	75,000	64	.00586
Peas, dried	65,000 bushels	1,950	130,000	64	.00586
Paper		328	46,000	64	.00468
Rye	225,865 bushels	6,324	168,000	64	.00418
Wool		36	1,600	64	.0117
Total		120,785	3,914,800	....	....
IMPORTS.					
Barley	6,000 bushels	144	4,000	70	.025
Beer	2,100 barrels	160	6,000	102	.0275
Coal		30,887	110,000	132	.00227
Flour		32	1,800	64	.00418
Fruit, green	3,750 packages	20	550	64	.039
Iron and steel		2,710	203,000	104	.0185
Lumber	249,000 feet b. m.	440	4,500	60	.0142
Merchandise, general		20,979	2,600,000	116	.0258
Mill stuffs		38	700	64	.00651
Plaster, land		150	900	64	.00651
Salt		424	2,100	64	.00468
Ties, railroad	4,000	270	1,800	100	.0105
Wood	416 cords	832	2,100	75	.01
Total		57,086	2,937,450	....	....
Total exports and imports		177,871	6,852,250	....	....

JJ 11.

IMPROVEMENT OF TWO RIVERS HARBOR, WISCONSIN.

Operations during the fiscal year.—Under a contract with August Rieboldt and Joseph Wolter for removing old pier, building pile pier, dredging, etc., work was in progress at the beginning of the fiscal year and was completed November 24, 1909. The pile pier has been built, a portion of the old north pier removed, and 140,983 cubic yards dredged in the channel and stilling basin, of which 21,440 cubic yards was dredged during the fiscal year, at a cost of 11½ cents per cubic yard. A small amount of aditional riprap was deposited along the outer end of the new pile pier and at the inner end of the north revetment.

Condition of the improvement.—Soundings completed May 25, 1910, showed a channel 16 feet below datum, with a minimum width of 140 feet at entrance.

The project for the improvement of this harbor is now completed and the piers are generally in good condition. It is probable, however, that annual dredging will be required for maintenance of channel at the entrance. The funds available are sufficient for the maintenance of this harbor until June 30, 1912; therefore no appropriation is recommended.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 332)	$242,500
March 3, 1905	6,600
March 2, 1907	90,000
June 25, 1910	5,000
Total	344,100

COMMERCIAL STATISTICS YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened, April 1, 1909; closed, December 1, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	15	2	17	13,485
Barges and sailing	22		22	2,274
Total	37	2	39	15,759

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Hay		180	$2,160	81	$0.0185
IMPORTS.					
Coal, hard		2,832	18,000	754	.00067
Coal, soft		15,427	54,000	645	.00078
Fish, fresh	820,000 pounds	410	50,000	8	([a])
Fruit		40	600	58	.0508
Lumber	1,720,000 feet b. m.	3,000	26,500	74	.0127
Salt	1,035 barrels	155	830	62	.014
Stone		300	1,100	55	.0127
Wood	466 cords	845	2,350	90	.0093
Total		23,009	153,380		
Total exports and imports		23,189	155,540		

[a] Local catch; no rate.

JJ 12.

IMPROVEMENT OF MANITOWOC HARBOR, WISCONSIN.

Operations during the fiscal year.—The project provides for rubble mounds capped with concrete-steel caissons to connect the crib breakwaters and pile piers on each side of the harbor. The work of leveling the rubble mounds preparatory to sinking the caissons, which was in progress at the beginning of the fiscal year, has been completed and all caissons sunk in place and filled. This work was done by hired labor and use of government plant, and was completed September 30, 1909.

During November, 1909, the caisson breakwaters were thoroughly riprapped, the work being done by purchase of materials and hire of labor.

Under contract with Ernst Schmidt, dredging was begun July 1 and completed August 10, 1909, 75,300 cubic yards having been dredged at a cost of 13½ cents per cubic yard. As there still remained a considerable amount of dredging to be done, and as Mr. Schmidt was unable to furnish a dredge, an emergency contract was entered into with Mr. Samuel O. Dixon for completing the dredging. Under this contract 16,466 cubic yards was removed at a cost of 13½ cents per cubic yard.

Building the concrete superstructure on caisson breakwaters was begun June 8, 1910, and is in progress at the close of the fiscal year. The work is being done by hire of labor, purchase of materials, and use of government plant. At the close of the fiscal year it was two-thirds completed and will probably be finished about the middle of July.

Condition of the improvement.—Soundings completed May 21, 1910, showed a channel over 21 feet deep with a least width at entrance of about 400 feet. At a point opposite the south stub pier the width of the channel is about 240 feet, diminishing to a width of about 120 feet opposite the warehouse of the Goodrich Transit Company.

In the Annual Report for 1909 it was stated that the superstructure on 400 feet of the north crib breakwater was badly decayed and should be rebuilt in concrete, and that while the remainder of the superstructure was still fairly serviceable it would only be a matter of six or eight years before it would have to be rebuilt. It was therefore recommended that the entire superstructure of the north crib breakwater be rebuilt in concrete, as it was believed that by so doing a lower unit price could be obtained. A recent inspection of this crib breakwater, however, shows it to be in fairly good condition and that with minor repairs the present timber superstructure will last for at least five years. The remainder of the piers and breakwaters is in good condition, and nothing but minor repairs will be necessary.

Dredging for maintenance of channel will probably be necessary from time to time, but recent soundings have shown that the project depth is well maintained.

It is believed that the funds available are sufficient for the maintenance of the harbor to June 30, 1912. Therefore no appropriation is recommended.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 329)	$448, 560. 00
March 3, 1905	110, 000. 00
March 2, 1907	100, 000. 00
May 27, 1908	270, 500. 00
June 25, 1910	17, 500. 00
Miscellaneous receipts credited to appropriations	252. 72
Total	946, 812. 72

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 1, 1909; closed December 31, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	1,587	4	1,591	2,046,468	[a] 1,750
Sailing	77		77	25,473	
Total	1,664	4	1,668	2,071,941	1,750

[a] Estimated.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Barley	359,063 bushels	8,611	$233,000	353	$0.00125
Copper		18,323	4,695,000	70	.00357
Corn	666,350 bushels	18,680	433,000	277	.00133
Flour	37,200 barrels	3,720	208,000	208	.00235
Lumber	68,063,700 feet b. m	136,000	1,100,000	70	.00383
Malt		18,248	700,000	70	.005
Merchandise, general		139,644	14,000,000	75	.0125
Mill stuffs		27,843	500,000	70	.005
Oats	5,300,050 bushels	84,801	2,387,000	319	.0015
Rye	89,700 bushels	2,512	67,000	70	.00383
Wheat	12,000 bushels	360	13,000	70	.00357
Total		458,742	24,336,000		
IMPORTS.					
Cement		1,339	12,000	761	.00158
Coal		641,880	2,570,000	350	.00087
Iron and steel		20,362	15,000	70	.00536
Lumber	7,952,000 feet b. m	15,900	130,000	70	.00383
Merchandise, general		181,052	22,500,000	76	.0126
Salt	13,438 barrels	2,016	10,000	61	.0041
Steel rails	2,512 gross tons	2,813	71,000	761	.00197
Sugar		406	42,500	761	.00184
Wood	2,600 cords	5,200	12,500	110	.00725
Total		870,968	25,363,000		
Total exports and imports		1,329,710	49,699,000		

NOTE.—About 60 per cent of the total grain and flour shipments via car ferries.

JJ 13.

IMPROVEMENT OF SHEBOYGAN HARBOR, WISCONSIN.

Operations during the fiscal year.—Under a contract with Ernst Schmidt dredging for restoration of channel was begun August 10 and completed September 4, 1909. Under this contract 19,986 cubic yards was dredged at a cost of 18 cents per cubic yard.

Minor repairs were made to breakwater, the work being done by hire of labor, purchase of materials, and use of government plant.

Condition of the improvement.—Soundings completed May 26, 1910, showed a channel 21 feet below datum, 180 feet wide at outer end and decreasing to a width of about 100 feet opposite the life-saving station. There are several small shoals throughout this channel with a minimum depth of about 20 feet over them.

The present project, recommended by the wave action board in report of July 15, 1905 (House Doc. No. 62, 59th Cong., 1st sess.), and adopted by Congress March 2, 1907, provides for the maintenance of a 21-foot channel and the works incident thereto, for extension of north breakwater, for a south breakwater, and for subsequent necessary extensions to each breakwater.

Attention is particularly invited to report on Sheboygan Harbor, Appendix J. J. 12, Annual Report of 1909, in which the reasons for the construction of the extension of the north breakwater are set forth and estimates submitted for the completion of the present project. As stated in the Annual Report for 1909, it is believed that only the north breakwater should be built first. The south pier should not be undertaken until the necessity for it is demonstrated, for it is believed that a partial improvement of the harbor by building the north breakwater will fully satisfy all necessities of navigation.

The estimated cost of this partial improvement is as follows:

1,750 linear feet reenforced concrete caissons (north breakwater), at $134	$234,500
1,130 linear feet pile pier (north breakwater), at $47	53,110
Removing 1,700 linear feet old north pier, at $15	25,500
6,500 tons stone, riprap, and filling for old breakwater, at $1.40	9,100
50,000 cubic yards dredging, at 15 cents	7,500
Contingencies, superintendence, etc	32,290
Total	362,000

This estimate makes no provision for rebuilding the superstructure of the south pier, which is in bad condition. It is believed, however, that nothing should be done to the south pier, other than to make such temporary repairs as may be necessary to preserve it from demolition by storms, until it has been fully demonstrated that the south breakwater is not necessary; then the present south pier should be thoroughly repaired.

The superstructure of both existing piers are in bad condition, and if the further improvement of this harbor by extension of the north pier is not to be undertaken these superstructures should be rebuilt. On the other hand, if the extension of the north breakwater is to be undertaken in the immediate or near future, then only such temporary repairs should be made to the piers as may be necessary to preserve them from demolition by storms.

This harbor is becoming more important each year. The receipts of coal and shipments of same to the interior are increasing yearly. The extensive coal docks of the C. Reiss Coal Company were destroyed by fire toward the close of the season of 1909, and consequently coal receipts were less for 1909 than for 1908. These docks are being rebuilt and equipped with the latest coal-handling machinery, and it is understood that the C. Reiss Coal Company propose to make Sheboygan one of their principal receiving ports.

Aside from rebuilding the present piers the funds available are sufficient for maintenance of the channel and also for such temporary repairs as may be necessary to preserve the piers from demolition.

As it is therefore probable that the extension of the north breakwater to the shore will be urgently needed in the near future it will be inadvisable at this time to expend much money on the repairs of existing piers. For the foregoing reasons no appropriation is recommended.

It is believed that this harbor is worthy of improvement as provided by existing project.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 331)	$564,848.91
March 3, 1905	18,000.00
March 3, 1905 (allotted Aug. 23, 1906)	3,819.21
March 2, 1907	40,000.00
March 3, 1909 (allotment for preservation and maintenance, Apr. 9, 1909)	5,000.00
June 25, 1910	32,500.00
Miscellaneous receipts credited to appropriations	151.34
Total	664,319.46

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 1, 1909; closed December 31, 1909.

Vessel classification.

COMMERCIAL STATISTICS YEAR ENDING DECEMBER 31, 1909.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	1,006	1,006	860,823	[a] 700
Sailing	226	226	30,429	....
Total	1,232	1,232	891,252	700

[a] Estimated.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Chairs		55	$12,000	103	$0.0514
Cheese	1,300,000 pounds	650	169,000	127	.0271
Eggs	436,350 dozens	400	83,000	127	.0313
Fish, fresh	1,460,000 pounds	730	110,000	135	.0492
Furniture		5,000	1,500,000	114	.046
Leather	4,600,000 pounds	2,300	1,850,000	114	.0486
Merchandise, general		2,650	330,000	116	.0457
Peas, dried		50	3,300	62	.0284
Total		11,835	4,057,300	....	....
IMPORTS.					
Agricultural implements	200,000 pounds	100	15,000	53	.0623
Apples	220 barrels	17	500	70	.042
Automobiles		25	25,000	94	.115
Bark, tan	1,235 cords	1,420	13,000	400	.0054
Cheese	1,076,000 pounds	538	150,000	56	.0398
Coal, hard		195.000	1,260,000	780	.00047
Coal, soft		265,700	795,000	630	.00058
Cooperage		400	8,000	155	.0097
Fruit	29,400 baskets	150	6,000	70	.042
Hay		200	2,600	43	.0349
Lumber	5,098,000 feet b. m	....	92,000	155	.00645
Merchandise, general		7,413	1,100,000	114	.0482
Posts, fence	59.700	1,134	6,000	175	.00903
Potatoes	550 bushels	17	350	70	.0214
Salt		13,790	70,000	70	.0058
Shingles and lath		275	3,000	120	.0083
Stoves	141,000	70	14.000	126	.0376
Wagons and carriages		100	10.000	65	.0724
Wood	6,274 cords	12,550	33,500	125	.006
Total		417,820	3,603.950	....	....
Total imports and exports		519,655	7,661,250	....	....

JJ 14.

IMPROVEMENT OF PORT WASHINGTON HARBOR, WISCONSIN.

Operations during the fiscal year.—Dredging for restoration of channel was begun June 18 and is in progress at the close of the fiscal year. The work is being done by the government dredging plant, and up to June 30, 1910, 13,606 cubic yards of material has been dredged at a cost of 9.4 cents per cubic yard.

Condition of the improvement.—Soundings completed May 27, 1910, show a channel with a minimum depth of about 12 feet below datum. It is expected that the dredging now in progress, and which will be completed early in July, will provide for a maximum draft of at least 12 feet at the present stage of water.

A report on a survey of this harbor, provided by the river and harbor act approved March 3, 1909, was submitted September 14, 1909. The project therein proposed provides for dredging to obtain a depth of 18 feet below datum and for necessary repairs of piers. This project was adopted by the river and harbor act approved June 25, 1910, and the entire amount estimated for completion of said project was appropriated by said act.

The funds available are sufficient for the completion of the project and for maintenance of the harbor until June 30, 1912; therefore no appropriation is recommended.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 330)	$204,900.00
March 3, 1909 (allotment for preservation and maintenance Mar. 26, 1909)	4,000.00
June 25, 1910	30,000.00
Miscellaneous receipts credited to appropriations	68.25
Total	238,968.25

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened May 28, 1909; closed August 14, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage
Registered:			
Steamers	7	7	3,747
Barge and sailing	7	7	864
Total	14	14	4,611

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
IMPORTS.[a]				*Miles.*	
Coal, hard		1,157	$7,200	800	$0.00081
Coal, soft		4,105	13,000	650	.00098
Lumber[b]					
Wood	363 cords	726	2,000	150	.00668
Total imports		5,988	22,200		

[a] No exports.

[b] Amount of lumber received by boat could not be obtained.

J J 15.

IMPROVEMENT OF MILWAUKEE HARBOR, WISCONSIN.

Operations during the fiscal year.—Work under the contract with The Edward Gillen Dock, Dredge and Construction Company, for extending the breakwater 980 feet, was in progress at the beginning of the fiscal year, and was completed August 4, 1909. The breakwater has been extended 980 feet by five timber cribs each 196 feet in length, placed on a stone foundation and covered with timber superstructure.

Work under the contract with Mr. William H. Gillen, for construction of new south pier, removal of old pier, and dredging, was in progress at the beginning of the fiscal year, and was continued until November 27, 1909, when it was suspended for the season. Work was resumed March 30, 1910, and is still in progress. All caissons—14 in number—have been sunk in place and the pile pier completed, but no superstructure has been built on any portion of the pier. A small portion of the old south pier has been removed. The work of dredging has not yet been commenced. It is expected that the entire work will be completed in August, 1910.

Under emergency contract with Mr. William H. Gillen, concrete superstructure similar to that built on the older portion of the breakwater was built over the 60 feet adjoining the 980-foot extension. This work could not be done under the original contract, as the lighthouse occupied this portion of the pier, and it could not be moved until the completion of the 980-foot extension.

Minor repairs were made to the launching ways, which are owned by the United States, and on which the reinforced concrete caissons are built.

Condition of the improvement.—The harbor channel has the required depth of 21 feet, with a minimum width of about 180 feet. Under the contract now in force this width will be increased to about 225 feet.

A report on a survey with a view to the creation of an outer harbor; also with a view to a modification of the present plan of improvement by providing for widening the channels in the inner harbor instead of the construction of certain turning basins heretofore authorized, as provided by river and harbor act approved March 3, 1909, was submitted October 9, 1909.

The contracts now in force provide for the completion of the existing project. The funds available are sufficient for the completion of the project and for maintenance until June 30, 1912; therefore no appropriation is recommended.

APPROPRIATIONS.

HARBOR AND HARBOR OF REFUGE.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., pp. 329-330)	$1, 631, 975. 36
March 3, 1905	150, 000. 00
March 2, 1907	200, 000. 00
May 27, 1908	392, 000. 00
Miscellaneous receipts credited to appropriations	1, 898. 59
Total	2, 375, 873. 95

CONTRACTS IN FORCE.

For reconstruction of the south pier of reenforced concrete caissons and pile pier, removing old pier, and dredging, material and labor to be paid for at the following rates: For No. 1 concrete in caissons, at $15.50 per cubic yard; No. 1 concrete in pile pier, at $9 per cubic yard; No. 2 concrete in caissons, at $9 per cubic yard; No. 2 concrete in pile pier, at $9.50 per cubic yard; No. 3 concrete, at $6 per cubic yard; foundation piles, driving, cutting off, etc., piles to be furnished by the United States, at $7.50 per pile; driving round piles in pile pier, piles to be furnished by United States, at 17 cents per linear foot; making and driving sheet piles, timber furnished by United States, at $15 per thousand feet b. m.; framing timber, furnished by United States, at $18 per thousand feet b. m.; wrought-iron or steel driftbolts and wrought-iron or wire spikes, at 5 cents per pound; wrought-iron or steel screw bolts and tie-rods, at 5 cents per pound; stone, at $1.45 per ton of 2,000 pounds; removing old pier, at $15 per linear foot; dredging, at 17 cents per cubic yard (scow measurement).

Name of contractor: William H. Gillen.
Date of contract: March 1, 1909.
Date of approval: March 9, 1909.
Date of commencement: April 11, 1909.
Date of completion: November 11, 1910.

Since entering into the aforesaid contract on March 1, 1909, it has been discovered that for a portion of the site of foundation for south pier, Milwaukee Harbor, Wisconsin, the material into which the piles are to be driven is so soft for so great a depth as to prevent securing a safe and secure foundation by using files 35 to 40 feet long, provided for in said contract of March 1, 1909, that a supplemental contract was entered into providing for driving, cutting off, etc., foundation piles from 45 to 50 feet in length, at $9 each, the piles to be furnished by the United States.

Name of contractor: William H. Gillen.
Date of supplemental contract: September 20, 1909.
Date of approval: September 24, 1909.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 20, 1909; closed December 5, 1909.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	5,281	7,801,230	136,079
Sailing	242	90,378	....
Total	5,523	7,891,608	136,079

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Barley	2,567,661 bushels	61,624	$1,720,000	628	$0.00079
Beans	1,147 bushels	34	2,700	83	.0362
Beer	5,252 barrels	919	35,200	83	.0262
Cement	220 barrels	44	350	83	.0132
Cheese	8,000 pounds	4	1,040	83	.0217
Corn	2,969,035 bushels	83,133	1,781,400	183	.0017
Flour	3,570,042 barrels	357,004	19,992,200	491	.00157
Hay		160	1,900	230	.0067
Hides	137,000 pounds	69	15,200	80	.01
Iron and steel, manufactured	10,256,000 pounds	5,128	384,600	50	.0332
Leather	8,920,000 pounds	4,460	1,561,000	70	.0265
Lumber	41,699,000 feet b. m.	72,973	790,000	91	.0028
Malt	67,072,820 pounds	33,536	1,380,000	828	.00145
Millstuffs		230,130	5,063,000	552	.00181
Oats	2,310,277 bushels	36,966	1,061,000	109	.00325
Oil cake		138	4,400	825	.00121
Paper	2,180,000 pounds	1,090	174,000	84	.0265
Peas, dried	50,630 bushels	1,519	101,300	529	.00384
Potatoes	2,000 bushels	60	1,300	84	.0226
Provisions	12,422,000 pounds	6,211	1,242,000	78	.0441
Rags	1,411,125 pounds	705	28,000	751	.0031
Rye	210,210 bushels	5,886	156,600	93	.00288
Salt	350 barrels	50	260	100	.014
Seed, clover	278,000 pounds	139	24,700	825	.0022
Seed, timothy	872,000 pounds	436	27,000	825	.0022
Tobacco	370,000 pounds	185	185,000	455	.0046
Wheat	959,810 bushels	28,794	1,055,800	618	.00091
Wool	1,955,300 pounds	978	430,200	707	.005
Total		932,375	37,219,950		
IMPORTS.					
Bark, tan	10,127 cords	11,650	106,500	330	.00068
Beans	2,000 bushels	60	4,780	80	.03
Butter	280,000 pounds	140	60,000	90	.0444
Cement	208,731 barrels	39,137	345,000	828	.00112
Coffee	11,160 sacks	737	2,900	828	.00121
Coal, hard		836,022	4,600,000	820	.0006
Coal, soft		3,191,721	8,000,000	627	.00065
Corn	60,000 bushels	1,680	39,000	110	.0182
Eggs	47,400 dozen	43	9,000	50	.076
Flour	1,128 barrels	113	6,300	80	.03
Fruit	18,857 packages	236	9,000	90	.0311
Hay		106	1,275	80	.0188
Hides	326,885 pounds	163	36,000	83	.0121
Iron and steel	57,102,000 pounds	28,551	22,400	380	.0046
Lath	479,000	170	1,700	200	.003
Leather	100,000 pounds	50	17,500	80	.0198
Lime		20	200	81	.0086
Lumber	54,172,000 feet b. m	94,800	960,000	230	.00495
Oats	1,500 bushels	24	700	110	.0182
Ore, iron		191,711	700,000	450	.0017
Paper	946,000 pounds	473	94,600	828	.0019
Peas, dried	120,000 bushels	3,600	287,000	80	.08
Posts, fence	427,740	8,130	42,800	260	.0053
Potatoes	5,390 bushels	162	3,500	80	.0326
Salt	910,631 barrels	136,594	682,000	137	.0038
Seed, timothy	1,000,000 pounds	500	31,000	100	.006
Shingles	5,556,000	975	11,000	200	.0057
Stone		165,140	290,000	32	.0094
Ties, railroad	340,290	23,000	120,000	465	.00214
Wheat	503,005 bushels	15,000	555,000	80	.036
Wood	11,996 cords	21,000	60,000	200	.0057
Wool	90,000 pounds	45	19,800	83	.0061
Sugar	283,014 barrels	33,254	15,400	828	.00127
Total		4,805,097	17,124,355		
Total exports and imports		5,737,472	54,344,305		

J J 16.

IMPROVEMENT OF INNER HARBOR AT MILWAUKEE, WISCONSIN.

Operations during the fiscal year.—There have been no operations during the fiscal year.

Condition of the improvement.—The condition of the channels is believed to be practically the same as set forth in report to which reference is made in current summary.

The law provides that no part of the appropriation shall be expended "unless the Secretary of War shall have satisfactory assurances that the city of Milwaukee will comply with the conditions imposed upon said municipality." The river and harbor act approved June 25, 1910, provides for a modification of the project, which consists of widening the channel along Jones Island, the dredging off of certain points in the Menominee River, thereby making the latter more accessible to large vessels, and that balances of any amounts heretofore appropriated and authorized for the improvement of the inner harbor are made available for the execution of the modified project, provided that the diversion authorized shall not be made until the Secretary of War is satisfied that the conditions recommended as precedent thereto have been complied with by the city of Malwaukee. A portion of the necessary land has been donated to the United States, but no definite assurances have as yet been offered by the city that it will comply with the other conditions imposed by Congress. It is understood that condemnation proceedings have been commenced by the city of Milwaukee to secure the remainder of the land necessary for carrying out the project of improvement so far as the same relates to the Kinnickinnic River.

APPROPRIATIONS.

March 3, 1905	$100,000

J J 17.

IMPROVEMENT OF RACINE HARBOR, WISCONSIN

Operations during the fiscal year.—Dredging for restoration of channel was begun April 15 and completed May 19, 1910. Soundings taken on completion of dredging having shown that a bar was forming at the outer end of the piers, dredging for its removal was begun June 11 and completed June 14, 1910. The dredging was done by the government dredging plant, and 16,184 cubic yards was removed at a cost of 17.6 cents per cubic yard.

Minor repairs were made to the breakwater by hire of labor and purchase of materials.

Condition of the improvement.—Soundings completed June 4, 1910, show that the channel has a depth of 21 feet below datum, with a least width of about 150 feet.

The funds available are sufficient for completing the partial improvement, consisting of the extension of the north breakwater, the removal of old north pier, and dredging, as set forth in Annual Report for 1909, page 1973.

While the estimate for this partial improvement made no provision for rebuilding the superstructure of the south pier, which is in bad condition, it is believed that the funds available are sufficient to make such partial repairs of the superstructure as may be necessary to preserve it from demolition by storm; therefore no appropriation is recommended.

It is believed that this harbor is worthy of improvement as provided by existing project.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 331)	$474, 435. 00
April 28, 1904 (allotment July 12 and 13 and Oct. 11, 1904)	6, 284. 67
March 3, 1905	30, 000. 00
March 2, 1907	50, 000. 00
March 3, 1909 (allotment for preservation and maintenance, Apr. 9, 1909)	5, 000. 00
June 25, 1910	243, 000. 00
Miscellaneous receipts credited to appropriations	414. 80
Total	809, 134. 47

COMMERCIAL STATISTICS YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 1, 1909; closed December 31, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	1,354	1,354	996,047	[a] 2,450
Sailing	51	51	21,096	
Total	1,405	1,405	1,017,143	2,450

[a] Estimated.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Agricultural implements	4,200,000 pounds	2,100	$250,000	60	$0.03
Automobiles	2,500	3,000	2,500,000	60	.0867
Automobile tops and bodies	2,000	600	250,000	60	.11
Coal [a]		2,000			
Fish (fresh)	400,000 pounds	200	36,000	60	.075
Furniture	6,000 pieces	300	30,000	60	.08333
Leather	2,350,000 pounds	1,125	[b] 2,350,000	55	.0562
Lime and cement [a]	2,000 barrels				
Manufactured iron and steel	6,500,000 pounds	3,250	243,700	46	.03174
Merchandise, general [c]		20,000	3,000,000	57	.0358
Piano stools	47,000 pieces	470	1,500	60	.047
Provisions	650,000 pounds	325	65,000	57	.0579
Sash, doors, and blinds	3,000	150	30,000	60	.06
Stone [a]	3,000 cords	16,500			
Wagons and carriages	4,200	315	420,000	55	.0527
Miscellaneous		5,000			
Total		55,335	9,176,200		

[a] Boat cleared without unloading; no rate on this transfer.

[b] High-grade upper leather for shoes.

[c] Estimated; includes sundries.

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
IMPORTS.					
				Miles.	
Agricultural implements	300,000 pounds	150	$18,000	34	$0.0706
Apples	8,000 barrels	600	6,000	50	.0424
Automobiles	60	60	7,200	51	.1962
Beans	3,000 bushels	90	6,900	50	.0472
Butter	410,000 pounds	205	94,000	48	.0677
Chairs	2,300	28	2,900	51	.08
Cheese	55,000 pounds	27	7,150	50	.066
Coal, hard		48,000	293,000	837	.000696
Coal, soft		85,000	263,000	675	.000758
Eggs	78,000 dozen	130	15,000	51	.0657
Fish	20,000 pounds	10	1,600	57	.0593
Flour	3,100 barrels	333	16,700	57	.0435
Furniture	8,300 pieces	415	41,500	50	.0802
Hides	2,350,000 pounds	1,175	235,000	60	.01
Leather	3,125,000 pounds	1,562	546,000	46	.0661
Lumber	10,000,000 feet b. m	15,000	200,000	185	.0054
Manufactured iron and steel	8,000,000 pounds	4,000	800,000	50	.0308
Marble	750,000 pounds	375	5,000	60	.01
Merchandise, general[a]	30,000 tons	30,000	4,500,000	50	.0424
Pork and beef	1,000 barrels	125	27,500	60	.0384
Poles, telegraph	500	85	2,000	210	.00762
Posts, fence	3,000	57	750	295	.00576
Potatoes	8,000 bushels	240	4,800	90	.0231
Provisions	12,000,000 pounds	6,000	1,200,000	46	.0496
Salt	3,000 barrels	430	2,250	120	.00408
Stone	1,000 cords	5,500	7,000	150	.00367
Wagons and carriages	300	225	30,000	53	.1144
Wood	1,800 cords	3,600	11,000	210	.005
Wooden ware	350,000 pieces	1,300	35,000	52	.0568
Wool	640,000 pounds	320	140,800	60	.0434
Total		205,087	8,020,050		
Total exports and imports		260,372	17,196,250		

[a] Estimated; includes sundries.

J J 18.

IMPROVEMENT OF KENOSHA HARBOR, WISCONSIN.

Operations during the fiscal year.—Under contract with Mr. P. W. Galloway for extending the breakwater 196 feet landward, work was in progress at the beginning of the fiscal year and was completed September 11, 1909. The extension consists of one timber crib 196 feet long placed on a stone foundation and provided with timber superstructure.

By hire of labor and purchase of materials repairs were made to the north pier which had been badly damaged by ice.

Dredging for restoration of project depth in basin was begun May 10 and completed May 16, 1910. The work was done by use of the government dredging plant, and 8,883 cubic yards of material was removed, at a cost of 7.7 cents per cubic yard.

Condition of the improvement.—Soundings completed April 2, 1910, show a depth of 20 feet between the piers, and the dredging completed in May provided a depth of 20 feet in the basin over a sufficient area to permit of turning vessels.

About 775 feet of the superstructure of the south pier needs partial rebuilding. Minor repairs to piers and breakwater will be required, and dredging for maintenance of channel will be necessary.

The following estimate for maintenance of channel and existing works to June 30, 1912, is submitted:

For rebuilding 775 feet of superstructure (south pier), at $8	$6.200
For minor repairs to piers and breakwater	1,000
For dredging 14,000 cubic yards, at 20 cents	2,800
For contingencies, superintendence, etc	1,000
Total	11,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912. for maintenance of improvement	[a] $11,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total to June 13, 1902 (H. Doc. No. 421, 57th Cong., 2d sess., p. 329)	$489,307.41
March 3, 1905	5,000.00
March 2, 1907	22,000.00
March 3, 1909 (allotment for preservation and maintenance, Mar. 26, 1909)	10,000.00
June 25, 1910	12,500.00
Miscellaneous receipts credited to appropriations	157.71
Total	538,965.12

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 2, 1909; closed December 30, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.
Registered:			
Steamers	363	363	109,311
Sailing	36	36	9,457
Total	399	399	118,768

No passengers carried except by the small pleasure launches and sailboats, of which no record is kept.

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.					
Merchandise, general	9,896 tons	9,896	(a)	*Miles.* 83	$0.0241
IMPORTS.					
Bark, tan	4,750 cords	5,463	$49,875	415	.00523
Coal, hard	16,512 tons	16,512	104,850	842	.000618
Coal, soft	18,600 tons	18,600	55,430	655	.000794
Fruit	14,600 baskets	110	3,250	75	(b)
Lath	10,000 pieces	3.7	100	200	.005
Lumber	6,495,000 feet b. m	12,990	142,890	130	.0077
Merchandise, general	7,025 tons	7,025	(a)	83	.0313
Potatoes	6,300 bushels	189	3,150	200	(b)
Stone, crib	9,924 tons	9,924	14,900	174	.0026
Wood	1,525 cords	3,812	8,400	225	.0111
Total		74,629	382,845		
Total exports and imports		84,525	382,845		

[a] No reliable information could be obtained.

[b] These commodities are handled by small trading schooners which sell their cargoes in small quantities off of the boats. The allowances which these boats make for freight charges can not be obtained. No established rates exist for this kind of trading business.

J J 19.

IMPROVEMENT OF WAUKEGAN HARBOR, ILLINOIS.

Operations during the fiscal year.—Under contract with Adolph Green for building pile pier, removing old pier, and dredging, work was in progress at the beginning of the fiscal year and was completed August 2, 1910. Under this contract 33,823 cubic yards was dredged at a cost of 28 cents per cubic yard.

Minor repairs were made to the breakwater and to the warehouse.

Dredging for restoration of channel was begun May 17 and completed June 10, 1910. The work was done by government dredging plant, and 19,630 cubic yards was dredged at a cost of 12½ cents per cubic yard.

Condition of the improvement.—Soundings completed June 17, 1910, showed a channel 20 feet below datum, with a minimum width of 180 feet.

The project for the improvement of this harbor is now completed. The piers and breakwater are in good condition. Some additional stone will be needed, however, for riprap around the breakwater and at the outer ends of the harbor piers; also for filling cribs and piers where excessive settlements have occurred. It is probable that annual dredging will be required, especially on the bar which forms at the harbor entrance.

The following estimate for maintenance of channel and existing works to June 30, 1912, is submitted:

For 3,500 tons stone (riprap and pier filling), at $1.60	$5,600
For dredging 12,000 cubic yards, at 20 cents	2,400
For minor repairs to piers and breakwater	1,000
For contingencies, superintendence, etc	1,000
Total	10,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total to March 3, 1899 (H. Doc. No. 421, 57th Cong., 2d sess., p. 253)	$235,500.00
June 13, 1902	100,000.00
March 3, 1903	240,000.00
April 28, 1904	5,000.00
March 3, 1905	30,000.00
March 2, 1907	50,000.00
March 3, 1909 (allotment for preservation and maintenance, Mar. 27, 1909)	5,000.00
June 25, 1910	10,000.00
Miscellaneous receipts credited to appropriations	72.93
Total	675,572.93

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened January 1, 1909; closed December 31, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	641	641	392,599	[a] 5,000
Sailing	6	6	1,698	....
Tow and gasoline	13	13	5,738	[b] 3,164
Total	660	660	400,035	8,164

[b] Estimated.

[b] Motor boats.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
EXPORTS.				*Miles.*	
Brass, manufactured	85,000 pounds	42.5	$2,100	35	$0.0686
Merchandise, general	1,200 tons	1,200.0	180,000	34	.0694
Piles	800	360.0	4,000	7	([b])
Potatoes	2,500 bushels	75.0	1,900	35	.0573
Total		1,677.5	188,000	....	....
IMPORTS.					
Automobiles	25	25.0	25,000	35	.1713
Billets, iron and steel	1,800 gross tons	2,080.0	35,000	705	.001773
Brass, manufactured	425,000 pounds	213.0	20,000	35	.0686
Cattle	60	18.0	2,400	35	.02356
Coal (hard)	124,789 tons	124,789.0	685,000	860	.000534
Coal (soft)	18,147 tons	18,147.0	63,500	670	.000867
Fish	53,400 pounds	27.0	3,700	5	([c])

[a] Exclusive of the balance unexpended July 1, 1910.

[b] No rate for contractor at naval station.

[c] No rate for local catch.

Freight traffic—Continued.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
IMPORTS—continued.					
				Miles.	
Merchandise, general	8,000 tons	8,000.0	$1,200,000	35	$0.0572
Posts	10,000	190.0	2,500	330	.0052
Potatoes	7,400 bushels	222.0	5,500	210	([a])
Salt	117,017 barrels	16,717.0	87,700	310	.00386
Stone	7,150 tons	7,150.0	10,700	175	.00343
Ties, railroad	18,000	1,170.0	8,100	310	.00497
Total		178,748.0	2,149,100		
Total exports and imports		180,425.5	2,337,100		

[a] Peddlers handle these.

J J 20.

IMPROVEMENT OF FOX RIVER, WISCONSIN.

Attention is invited to the report upon "Operating and care of locks and dams on Fox River, Wisconsin."

Navigation closed November 27, 1909, and reopened April 2, 1910.

Operations during the fiscal year.—The work consisted in making repairs to Stockbridge and Brothertown harbors, dredging channel upper Fox River, and repairs of conveyor dredge.

Stockbridge harbor.—The decayed pile revetment was repaired by cutting off at the water surface and building up with timber protected by fender piles; three iron snubbing posts were set in concrete in the bank; the paving at either side of entrance was repaired. The work of dredging the entrance channel to a depth of 8½ feet and the basin to 7 feet was commenced and is now in progress; 1,020 cubic yards of material were removed.

Brothertown harbor.—The pile revetment was repaired and the bank behind the same filled in; the paving at entrance was repaired and extended 75 feet inshore on south side; other slight repairs were made.

Dredging upper Fox River.—Dredging was continued upstream to 4,490 feet above mile post 65 and from 900 feet below to 4,730 feet above mile post 69. The channel was also redredged from Princeton lock downstream to near mile post 51. These mile posts record the distance above Oshkosh. A small amount of redredging was done above Berlin lock. The dredging aggregates 278,561 cubic yards at a cost of 3.7 cents per cubic yard, including repairs to dredging plant.

Repairs of conveyor dredge.—The conveyor on the dredge was changed from a 32-inch to a 38-inch belt conveyor with new and large forming idlers, thereby greatly improving the efficiency of the plant. The necessary general repairs were also made to machinery.

Remarks and recommendations.—The improvement of the Fox River was originally undertaken in connection with the improvement of the Wisconsin River, thereby forming a Lakes-to-Gulf waterway. The improvement of the Wisconsin River was abandoned, however, in 1887, and with it the project for a through water route, so that at the present time the improvement of the Fox River, so far as navigation is concerned, is for the benefit of local commerce only.

Benefits to commerce resulting from this improvement are very small in comparison with expenditures, and especially is this true of that portion of the river above Oshkosh, known as the Upper Fox.

Above Oshkosh there are no large towns, and for much of the distance the river flows through immense meadows, which are at times partially submerged, and whose only crop is wild hay. The following are the only towns of importance on this portion of the river; in each case the population is approximate only, and the distance given is from Oshkosh via the river: Omro 1,500, distance 16½ miles; Berlin 4,800, distance 31 miles; Princeton 1,600, distance 49 miles; Montello 1,200, distance 76 miles; Portage 7,000, distance 106¾ miles. Each of these towns has railroad facilities. Practically the only commerce on the upper Fox River is between Oshkosh and Berlin. All attempts to maintain anything approaching a regular boat service above Berlin were abandoned over ten years ago, and navigation above Berlin is now limited to an occasional steamboat, to gasoline launches and other pleasure craft, and to movements of government plant.

The project depth of 6 feet has been obtained from Depere to Princeton lock, 4 miles above Princeton; but, owing to constant shoaling and change in low-water slope, due to dredging in upper reaches of river there is at the present time a depth of only 5 feet in parts of the channel above Oshkosh. It is believed that all interests of commerce will be fully subserved if the present depths are maintained, or, to state it more specifically, if a depth of 6 feet be maintained as far as Princeton lock, thence to Montello a depth of 4 feet, and thence to Portage a depth of 3 feet. Such commerce as now exists, or is likely to arise, can be carried on these depths, in vessels adapted to same. This is apparently a case where the type of vessel should be made to fit the river rather than to make the river fit a special type of vessel.

It is believed that the upper Fox River is unworthy of improvement, further than to obtain and maintain the depths specified in the preceding paragraph, and that if such depths and existing works are maintained all commercial and navigation interests, either present or prospective, will be fully subserved, unless the old plan of a Lakes-to-Gulf waterway by way of the Wisconsin River should be revived. For the reasons stated, and as the funds available are all that can be economically expended before June 30, 1912, and are believed to be sufficient to insure the depths specified in the preceding paragraph, no further appropriation is recommended, but if it is decided that the upper Fox River is worthy of improvement in the manner laid down by existing project, an amount sufficient for completion should be appropriated.

From 1873 to June 30, 1910, there has been expended on the upper Fox alone approximately $887,000. In Annual Report for 1908 a revised estimate amounting to $175,353.36 for completion of project was submitted. There has been appropriated and allotted since this estimate was submitted the sum of $45,000, so that at the present time the estimate for completion is $130,353.36. But from soundings recently taken it is evident that this estimate is entirely too low, and that the cost of completing the project will be very much greater.

It is probable that if the entire amount necessary to complete, as determined from a new survey and estimate, were available, the project could be completed within two or three years, for then it would be possible to build or purchase a sufficient plant, or else to award contracts at favorable figures and of such magnitude as to attract contractors having control of sufficient plant and labor to insure early completion. It is believed, furthermore, that the work would then be completed at much less cost than it would be under the policy of comparatively small appropriations from time to time, as has been the custom in the past. The deterioration both of completed channel and plant adds greatly to the cost of the work when carried on with a small plant. To this cause is probably due a large proportion of the increased estimates for completion of project. Sufficient funds should be available so that all the labor and plant which can be economically used may be employed during the working season.

It is therefore recommended that if further appropriation for the improvement of Fox River is made, it should be sufficient to complete the project, the cost of completion to be based upon a new estimate, to be prepared after having made a careful survey of that portion of the channel remaining to be improved.

APPROPRIATIONS.

Total to May 14, 1886 (H. Doc. No. 421, 57th Cong., 1st sess., p. 328)	[a] $2,693,993.97
August 4, 1886	[b] 129,403.10
August 5, 1886 (for Fox River)	56,250.00
February 1, 1888	[b] 100,024.53
February 1, 1888	[b] 1,067.09
February 1, 1888	[b] 10,539.25
August 11, 1888 (for Fox River)	100,000.00
October 19, 1888	[b] 15,318.26
September 19, 1890 (for Fox River)	100,000.00
September 30, 1890	[b] 156,552.70
July 13, 1892 (for Fox River)	75,000.00
July 28, 1892	[b] 109,022.33
March 3, 1893	[b] 30,985.50
August 18, 1894 (for Fox River)	37,500.00
August 23, 1894	[c] 6,263.34
June 3, 1896	[d] 3,000.00
June 3, 1896 (for Fox River)	37,500.00
March 3, 1899 (for Fox River)	[e] 27,500.00
June 13, 1902 (for Fox River)	[f] 70,000.00
March 3, 1905 (for Fox River)	35,000.00
March 2, 1907 (for Fox River)	[g] 35,000.00
March 3, 1909 (for Fox River; allotment for preservation and maintenance, Mar. 27, 1909)	20,000.00
June 25, 1910	25,000.00
Miscellaneous receipts credited to appropriations	9,201.39
	3,884,121.46
Less amount in act of March 3, 1899, for retaining wall at Kaukauna, Wis., which amount was returned July 15, 1909, to the surplus fund, Treasury United States, section 10, sundry civil act March 4, 1909	2,500.00
Total	3,881,621.46

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[a] Including all appropriations for Wisconsin River.

[b] For payment in connection with the subject of flowage damages.

[c] See also Green Bay Harbor.

[d] For investigation of subject of property rights of the United States in connection with the improvement of Fox and Wisconsin rivers.

[e] Of which $3,000 shall be used on Wolf River.

[f] Of which $10,000 shall be used on Wolf River and on Miller Bay, on west shore of Lake Winnebago.

[g] Of which $5,000 shall be used on Brothertown Harbor, east shore of Lake Winnebago.

COMMERCIAL STATISTICS, YEAR ENDING DECEMBER 31, 1909.

Season of navigation.—Opened April 6, 1909; closed November 27, 1909.

Vessel classification.

Class.	American.	Total.	Net registered tonnage.	Passengers.
Registered:				
Steamers	16	16	807	60,356
Tow barge	1	1	152	
Unregistered:				
Steamer	1	1	91	
Tow barge	1	1	81	
Scows	5	5	1,074	
Total	24	24	2,205	60,356

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	
Beer	535 half barrels	116.30	$3,213.00	20	$0.129
Brick	4,963,700	12,396.25	34,745.90	15	.0129
Butter	172,000 pounds	86.00	43,000.00	22	.0645
Cement	9,296.5 barrels	1,335.33	11,350.30	20	.0322
Cement blocks	500 pieces	27.50	202.50	12	.0322
Cinders	806 cubic yards	806.00	806.00	20	.0322
Coal		70,868.80	282,057.82	57	.0178
Cordwood	1,654¼ cords	3,308.50	11,579.75	49	.0161
Drain tile	34,195 pieces	87.89	8,789.00	17	.0322
Earth filling	1,265 cubic yards	1,265.00	632.50	7	.0161
Grain, flour, and feed		1,893.62	102,255.48	50	.0079
Hay		1,261.00	17,654.00	50	.0322
Lime	2,595 barrels	242.50	1,946.25	25	.0645
Live stock		10.40	1,664.00	7	.0322
Logs	13,634,260 feet	61,354.17	109,074.08	30	.0022
Lumber	1,259,000 feet b. m	5,283.00	27,698.00	50	.0219
Paper		50.00	10,000.00	30	.0357
Pipe, iron		50.00	3,600.00	57	.0645
Potatoes	9,600 bushels	288.00	4,800.00	30	.0268
Power launches and rowboats	42	185.50	6,900.00	32	.0322
Pulp, plaster		37.00	277.50	25	.0178
Pulp, wood	4,300 cords	430.00	17,200.00	30	.0133
Merchandise, general		4,352.75	652,912.50	50	.0645
Salt	2,893 barrels	507.04	2,169.75	44	.0322
Sand and gravel	18,384 cubic yards	27,576.00	22,980.00	7	.0107
Shingles and laths	1,736,000 feet	256.10	12,152.00	50	.0222
Stone	604½ cords	3,928.00	4,910.00	17	.0148
Stone, crushed	9,700 cubic yards	14,550.00	11,600.00	7	.0107
Sugar		63.55	6,990.50	7	.0645
Sugar beets		2,417.00	24,170.00	12	.0666
Ties, railroad	853	85.30	383.85	49	.0161
Total		215,118.50	1,437,714.68		

Number of lockages on Fox River, Wisconsin, for the calendar year 1909.

No.	Lock.	Lockages.	No.	Lock.	Lockages.
1	Depere	1,600	16	Appleton second	713
2	Little Kaukauna	1,226	17	Appleton first	784
3	Rapide Croche	1,020	18	Menasha	1,566
4	Kaukauna fifth	831	19	Eureka	1,507
5	Kaukauna fourth	840	20	Berlin	1,132
6	Kaukauna third	841	21	White River	413
7	Kaukauna second	850	22	Princeton	500
8	Kaukauna first	850	23	Grand River	1.214
9	Little Chute fourth [a]	721	24	Montello	770
10	Little Chute third [a]	721	25	Governor Bend	1,044
11	Little Chute second	718	26	Fort Winnebago	2.094
12	Little Chute first (guard lock)		27	Portage	163
13	Cedars	726			
14	Appleton fourth	742		Total	24,298
15	Appleton third	712			

[a] Combined.

J J 21.

OPERATING AND CARE OF LOCKS AND DAMS ON FOX RIVER, WISCONSIN.

Under an allotment from the indefinite appropriation for operating and care of canals and other works of navigation there has been expended during the year ending June 30, 1910, the sum of $55,449.28.

The work accomplished has been dredging bars and channels; making repairs to locks, dams, and canal banks, dredges, boats, etc., as given below:

Little Kaukauna lock.—During the past fiscal year the entire power generated by the dam at this place has been utilized for operating a large pulp mill erected by the Lindauer-O'Connell Company. The permit granted by the Secretary of War to place 2-foot flashboards on the dam required that the lock walls, gates, and canal banks be raised the same amount. This work was all completed in accordance with approved plans, with the exception of raising the left canal bank, which is now being done. The chamber walls were raised with concrete, faced with timber and plank; the head and tail walls were raised with cement masonry, faced with cut stone.

The repairs made were: Four new fender piles were driven below the lock; a broken anchor strap and the lower right wing wall were repaired; the paving of left bank above lock was removed to allow straightening of bank.

Lock house at Little Kaukauna lock.—A contract was entered into with Albert Luckow and John Coppes, of Kaukauna, Wis., for the construction of a lock master's dwelling similar to the two erected at Little Chute during the last fiscal year, the only change being the rearrangement of the rooms. The building is about 50 per cent completed.

Little Kaukauna dam.—The lower apron, the trestles over the sluiceways, and the walk leading thereto, were repaired. Flashboards were placed on the dam by the Lindauer-O'Connell Company in May and have since been maintained.

Rapide Croche lock.—Two cast-iron snubbing posts were set in concrete above the lock; 3 fender piles were driven below the lock; the canal banks above the lock, where defective, were riprapped with stone; a broken spar and hand rail were repaired.

Rapide Croche dam.—The masonry of the left abutment of dam was pointed, and a leak behind the abutment stopped by sheet piling and clay puddling across the bank. The roof of needle house was reshingled.

Kaukauna fifth lock.—Tripod platforms of reinforced concrete were built at this lock; 3 cast-iron snubbing posts were set on the right bank above the lock; the retaining wall on the right above the lock was repointed; a new lower gauge was placed; screens were provided for the lock house.

Kaukauna fourth lock.—The lower wing walls were relaid above water in cement and the bank behind same filled in; the lower right wing was extended 14 feet at right angles to face of wall to protect the bank; 5 cast-iron snubbing posts were set in concrete; the left bank below lock was sloped and paved; the right bank above and the waste weir ditch below were repaired.

Kaukauna dry dock.—The gates were rebuilt and provided with a walk and gas-pipe hand rail across the top; the blocking was replaced with new material.

Kaukauna second lock.—The left bank of canal between the lock and dry dock was sloped and paved with stone.

Kaukauna second lock house.—A stone foundation was built under the wing; the front porch was repaired and stone piers built to support it; other minor repairs were made.

Kaukauna first lock.—The gates were rebuilt above water and provided with modern heel-post caps instead of the old suspension columns; dry rubble walls were extended and repaired on either side of canal above lock; 4 cast-iron snubbing posts were set in concrete; 350 feet of the right bank of canal below lock was riprapped; the lower left wing wall was repaired and the steps rebuilt.

Kaukauna first lock house.—The front porch was rebuilt 6 feet wide and provided with stone pillar supports; new windows were provided; a drive gate and portal was placed at entrance to grounds.

Kaukauna warehouse.—The office was replastered and painted; the porch was repaired and a walk crossing the street was built.

Kaukauna dam.—The right abutment was reenforced with earth and stone.

Little Chute combined locks.—The walls of the waste-weir ditch were repaired; the left bank below lock was sloped and paved; 4 snubbing posts were set in concrete, 2 above and 2 below the locks; a roadway was graded from lock house to public highway, with a bridge crossing the waste-weir ditch; a fence was built from the lower end of locks to the boundary line of United States property; a well was drilled at the lock house and supplied with a pump.

Little Chute second lock.—The tripod platforms on the left side and the one on lower right side were rebuilt of reenforced concrete, supported by concrete pillars and provided with gas-pipe hand rails on the outer sides; 5 snubbing posts were set in concrete, 3 above and 2 below the lock; a dry retaining wall was built from the lower end of old lock along the left bank for 250 feet; a well was drilled at lock house and supplied with a pump; a woven-wire fence, supported by concrete fence posts, was built along the "Blue Line" on the left side from old First lock to Second lock.

Little Chute guard lock.—Decayed revetment planking above the water line in the old First lock was renewed.

Little Chute dam.—Decayed and waterworn plank in the upper apron was renewed and the dam backed with clay and gravel.

Cedars lock.—Four snubbing posts were set in concrete above the lock; the upper and lower valves were refitted and new stops placed.

Cedars lock house.—The roof was reshingled and the outhouse repaired.

Cedars dam.—This dam was backed with gravel.

Appleton fourth lock.—Four snubbing posts were set in concrete, 2 above and 2 below the lock on the left side.

Appleton fourth lock house.—A hard-maple floor was laid in the office; a wood shed was built for use of lockmaster.

Appleton lower dam.—Decayed and waterworn plank in the lower apron was renewed.

Appleton third lock.—Four snubbing posts were set in concrete, 2 above and 2 below the lock on the left side; the fence on left between toy factory and flume was rebuilt.

Appleton second lock.—Four snubbing posts were set in concrete, 2 above and 2 below the lock on left side; the lower wing walls and coping of lock walls were repointed.

Appleton second lock house.—A porch was built on front side of house; a walk was built from house to highway; a cistern was placed in cellar and eave troughs and conductor pipes placed.

Appleton public landing at Lake street.—Seven snubbing posts were set in concrete along the bank; the driveways were repaired with cinders and a steel portal was placed at southerly entrance; the warehouse was partitioned off for storage of cement; eave troughs were placed on roof with conductor pipe leading to low ground.

Appleton first lock.—The stairways at both upper and lower ends of the lock were rebuilt; the bridge crossing the old lock was moved to allow the stairway to land above the tripod platform; the left wall of the old lock was replanked and repaired with stone; 2 snubbing posts were set in concrete on the right above the lock; gas-pipe hand rails were placed along the head wall above the lock; the upper wing walls were repaired and pointed with Portland cement.

Appleton first lock house and warehouse.—A hard-maple floor was laid in one room; the siding was repaired; eave troughs and a screen door were provided for the lock house; a cinder floor was placed in timber shed; the driveway from lock house to Lake street was repaired and a drive gate, with portal and a walk gate, placed at the Lake street entrance.

Appleton upper dam.—The house over the hoisting carriage, where injured by lightning, was repaired; the wooden track and walk over sluiceways, which had become decayed, was replaced with a new track and walk of reenforced concrete, supported by steel I beams and channels and supplied with a gas-pipe hand rail.

Menasha lock house.—Slight repairs were made to porch of lock house, and drive gate, with portal, was placed at entrance to grounds; the fence crossing the left bank of canal above the lock was rebuilt, with a walk gate on canal bank.

Eureka dam.—Material for closing the navigable pass with a concrete structure containing steel sluice gates was collected and transferred to the dam preparatory to commencing the work, it having been impracticable to commence work sooner.

Berlin lock.—A coal shed 18 by 36 feet was erected on the left bank near the timber shed; the driveways at the lock were graveled; cement walks were laid at the lock house; a sink and cistern pump were purchased and placed in the lock house; 13 fender piles were driven, 10 above and 3 below the lock, to replace decayed ones.

Berlin dam.—Three fender piles were driven above the fishway.

White River lock.—Four new fender piles were driven below the lock.

Grand River dam.—Rubblestone was placed below the lower apron for reenforcing the dam.

Montello lock.—The coping timber was repaired; new sills were placed under the tripod platforms; the bank on the left side below the lock was sloped and riprapped with stone for a distance of 175 feet.

Montello dam.—The fishway and platform over same were repaired; 3 fender piles were driven above same.

Governor Bend lock.—The upper wing cribs, where burned, were rebuilt above the water surface; the sheathing in lower recesses was repaired.

Governor Bend dam.—This dam was backed with gravel.

Portage lock.—The tripod platforms were repaired.

Portage levee.—Stone was dredged from the old wing dams in the Wisconsin River and placed along the bank of the levee to protect the same from the upper end downstream a distance of 3,400 feet; the wing dam 3,400 feet below the upper end of the levee was raised 4 feet; the bank of the levee, where eroded by wave action below the slant of this wing dam, was riprapped and the break in the river bank at stations 59 to 61 was protected with a bank of stone 5 feet high and 188 feet long.

Miscellaneous.—Three rowboats, for use of lock masters, and two tool boxes were built for use on the works.

Dredging bars and channels.—To maintain a navigable channel and restore it to dimensions heretofore obtained, bars were removed from the upper river at various places by dredge *No. 5*, and aggregates 24,770 cubic yards, at a cost of $1,670.64. Adding 10 per cent for repairs and contingencies, the cost per cubic yard is about 7.4 cents. On the lower river the channel between Appleton first lock and the Chicago, Milwaukee and St. Paul Railway bridge above was cleaned, and the channel below Cedars lock was changed, to prevent a troublesome cross current. This was all rock work and was done by dredges *Nos. 4* and *5*, and aggregates 17,879 cubic yards, at a cost of $4,739.69. Adding 10 per cent for repairs and contingencies, the cost per cubic yard is about 29.2 cents.

Repairs of boats and dredges.—Numerous minor repairs were made to boats and dredges; extensive repairs were made to two dippers for dredge *No. 4;* two new prong arms and four points were purchased for grapple of dredge *No. 5.*

Special repairs to plant.—A flat scow, 70 by 18 by 4 feet, was built for use with pile driver; a ponton scow, 40 by 12 by 3 feet, was built for use with dredge *No. 5;* a small scow, 30 by 10 feet by 2 feet 8 inches, was built for use in making repairs on the lower river.

Expenditures under permanent indefinite appropriation provided by act of July 5, 1884, for operating and keeping in repair canals and other public works.

Total expenditures to June 30, 1902 (H. Doc. No. 421, 57th Cong., 1st sess., p. 328)	$993, 974. 12
Fiscal year ending June 30—	
1903	68, 482. 59
1904	50, 861. 52
1905	46, 427. 20
1906	44, 983. 29
1907	104, 565. 07
1908	45, 171. 78
1909	52, 940. 17
1910	55, 449. 28
Total	1, 462, 855. 02

Summary of expenditures made from appropriation for operating and care of canals and other works of navigation (indefinite), act of July 5, 1884, applied to Fox River, Wisconsin, during the fiscal year ending June 30, 1910.

Services	$36, 285. 75
Supplies	2, 104. 51
Materials	15, 928. 35
Miscellaneous	1, 130. 67
Total	55, 449. 28

OPERATING AND CARE OF CANALS AND OTHER WORKS OF NAVIGATION, APPLIED TO FOX RIVER, WISCONSIN.

[Section 4 of river and harbor act of July 5, 1884.]

Detailed statement of expenditures for fiscal year ending June 30, 1910.

Character of work, etc.	Item of expense.	Amount.	Total.
Repairs of Little Kaukauna dam	Materials	$446.67	
Do	Labor and transportation	228.62	$675.29
Repairs of Little Kaukauna lock	Materials	450.00	
Do	Labor and transportation	99.82	549.82
Building lock house at Little Kaukauna lock	Materials and labor		36.88
Repairs of Rapide Croche lock and house	Materials	148.05	
Do	Labor and transportation	105.84	253.89
Repairs of Rapide Croche dam	Materials	20.31	
Do	Labor and transportation	47.75	68.06
Repairs of Kaukauna dry dock	Materials	69.80	
Do	Labor and transportation	402.16	471.96
Repairs of Kaukauna second lock and house	Materials	80.71	
Do	Labor and transportation	121.92	202.63
Repairs of Kaukauna fourth lock	Materials	358.50	
Do	Labor and transportation	589.08	947.58
Repairs of Kaukauna fifth lock and house	Materials	296.10	
Do	Labor and transportation	86.24	382.34
Repairs of Kaukauna first lock	Materials	455.37	
Do	Labor and transportation	684.76	1,140.13
Repairs of Kaukauna first lock house and warehouse.	Materials	13.83	
Do	Labor and transportation	105.09	118.92
Repairs of Little Chute combined locks	Materials	226.92	
Do	Labor and transportation	286.04	512.96
Construction of lock house, Little Chute combined locks.	Materials and labor		3,242.12
Repairs of Little Chute second lock	Materials	493.57	
Do	Labor and transportation	606.55	1,100.12
Repairs of Little Chute guard lock	Materials	66.24	
Do	Labor and transportation	47.99	114.23
Repairs of Little Chute dam	Materials	348.00	
Do	Labor and transportation	557.75	905.75
Repairs of Cedars lock and house	Materials	43.80	
Do	Labor and transportation	47.55	91.35
Repairs of Cedars dam	Labor and transportation		166.66
Repairs of Appleton fourth lock and house	Materials	142.76	
Do	Labor and transportation	80.95	223.71
Repairs of Appleton lower dam	Materials	42.53	
Do	Labor and transportation	27.89	70.42
Repairs of Appleton third lock	Materials	44.32	
Do	Labor and transportation	28.97	73.29
Repairs of Appleton second lock and house	Materials	128.58	
Do	Labor and transportation	160.14	288.72
Landing at Lake street, Appleton	Materials	110.02	
Do	Labor and transportation	48.59	158.61
Repairs of Appleton first lock	Materials	235.12	
Do	Labor and transportation	193.98	429.10
Repairs of Appleton upper dam	Materials	321.54	
Do	Labor and transportation	106.20	427.74
Repairs of Menasha lock and house	Materials	38.46	
Do	Labor and transportation	21.93	60.39
Repairs of Eureka lock	Materials	17.46	
Do	Labor and transportation	5.00	22.46

Detailed statement of expenditures for fiscal year ending June 30, 1910—Continued.

Character of work, etc.	Item of expense.	Amount.	Total.
Repairs of Eureka dam	Materials	$462.44	
Do	Labor and transportation	36.94	$499.38
Repairs of Berlin lock	Materials	357.53	
Do	Labor and transportation	271.85	629.38
Repairs of White River lock	Materials		32.00
Repairs of Princeton lock	Labor and transportation		28.55
Repairs of Grand River lock and dam	Materials		125.00
Repairs of Montello lock and dam	do		49.88
Shore protection at foot of levee at Portage, Wis.	do	334.34	
Do	Labor and transportation	1,890.69	2,225.03
Maintenance of navigation	Lock masters' services	9,470.00	
Do	Lockmen's services	1,641.00	
Do	Gauge observer's services	65.00	
Do	Messenger and gauge observer's services.	501.67	11,677.67
Dredging bars and channels	Fuel, supplies, etc	1,738.68	
Do	Labor and transportation	4,103.09	5,841.77
General repairs to locks, dams, and canal banks	Materials	1,743.12	
Do	Labor and transportation	3,934.50	5,677.62
General repairs to plant, boats, dredges machinery, etc.	Repairs of tug Fox	582.90	
Do	Repairs of tug Wolf	438.74	
Do	Repairs of dredges Nos. 4 and 5.	745.12	
Do	Repairs of pile driver	15.67	
Do	Repairs of scow Eureka	36.25	
Do	Materials	560.60	
Do	Labor and transportation	491.95	2,871.23
Special repairs to plant	Seventy-foot scow	1,631.24	
Do	Two small scows	935.91	
Do	Labor and transportation	42.33	2,609.48
Care of works and property	Traveling expenses of assistant engineer, etc.	329.57	
Do	Watchman, labor and transportation.	2,775.71	
Do	Fuel for tugs Fox and Wolf	261.14	
Do	Lighting and improving grounds around locks.	74.62	
Do	Subsistence on inspection trips.	19.37	
Do	Miscellaneous	11.57	3,471.98
Superintendence and contingencies	Salary of assistant engineer	2,600.00	
Do	Salary of junior engineer	1,950.00	
Do	Salary of clerks, etc	1,625.00	
Do	Stationery	10.70	
Do	Rent of telephones and tolls	270.49	
Do	Telegrams	2.45	
Do	Mileage of officer	8.19	
Do	Rent of office, Oshkosh	480.00	
Do	Rent of post-office box, Oshkosh.	4.00	
Do	Miscellaneous	24.40	6,975.23
Total			55,449.28

OPERATING AND CARE OF CANALS AND OTHER WORKS OF NAVIGATION, INDEFINITE, APPLIED TO FOX RIVER, WISCONSIN.

CONTRACT IN FORCE.

For construction of a lock master's dwelling at Little Kaukauna lock, Wis., for the sum of $3,075.

Name of contractors: Albert Luckow and John Coppes.

Date of emergency contract: April 18, 1910.

Date of commencement: April 28, 1910.

Date of completion: July 2, 1910.

APPENDIX K K.

IMPROVEMENT OF RIVERS AND HARBORS IN THE FIRST CHICAGO, ILLINOIS, DISTRICT.

REPORT OF MAJ. THOS. H. REES, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Chicago Harbor, Illinois.
2. Chicago River, Illinois.
3. Calumet Harbor, Illinois.
4. Calumet River, Illinois and Indiana.
5. Indiana Harbor, Indiana.
6. Michigan City Harbor, Indiana.
7. Removing sunken vessels or craft obstructing or endangering navigation.

United States Engineer Office,
Chicago, Ill., July 14, 1910.

Sir: I have the honor to forward herewith the annual reports upon the works in my charge for the fiscal year ending June 30, 1910.

* * *

Very respectfully,

Thos. H. Rees,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

K K 1.

IMPROVEMENT OF CHICAGO HARBOR, ILLINOIS.

For statement of original conditions, projects, and scope of improvement, see summary, page 781.

For description of the outer basin and the improvements accomplished therein, see Report of the Chief of Engineers, U. S. Army, for 1905, page 2065.

There was no contract in force during the year for the improvement of this harbor.

In October, 1909, the southeasterly end of the exterior breakwater and the pile clumps at the west end of the north pier were damaged by collisions with vessels. These damages, as well as others caused by storms, were repaired between November 15 and December 15 under an agreement dated November 10, 1909, with the Great Lakes Dredge and Dock Company of Chicago. All efforts to ascertain what vessel caused the damage to the breakwater having failed, the cost of its repair, amounting to $3,263.24, was paid by this office. The cost of the new pile clump, $313.25, was paid by the Northern Michigan Transportation Company.

The north pier is the only one of the piers and breakwaters that is at the present time in first-class condition. The easterly and southerly breakwaters are in an extremely dilapidated condition and in need of new superstructures as soon as possible. The exterior breakwater is decayed in spots, but might remain unrepaired for a few years. The 1,225 outer linear feet of the south pier is badly in need of repair, and occupying as it does a prominent place at the harbor entrance is very unsightly; the superstructure should be rebuilt in concrete, as was recently the north pier.

The harbor entrance, up to Rush street, has an available channel of 21 feet depth. The easterly 1,100 feet of the outer basin has an average depth of about 19 to 21 feet. The westerly portion, which is used as an anchorage ground for yachts and other small craft, has not been dredged. The southerly entrance, from the lake to the basin, opposite Van Buren street, is shallow, the depth varying from 16 to 17 feet.

Dredging in the outer basin has been temporarily postponed, as work in the river was urgently demanded by navigation interests and was considered of more immediate importance than that in the basin.

Under act of Congress of May 28, 1908, any or all of the available balance of Chicago Harbor funds was made available, in the discretion of the Secretary of War, for expenditure on the existing project for Chicago River. In accordance with this authority, $193,000 was transferred from Chicago Harbor to Chicago River, and has been expended. This amount will be needed later whenever the completion of the original project becomes urgent.

By the act of Congress, approved June 23, 1910 (Public No. 245), it is unlawful to dump dredged material or refuse of any kind whatever into Lake Michigan, near Chicago, within 8 miles from shore. The act, however, makes no provision for inspection and supervision to see that its requirements are complied with.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $240,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total appropriations to December 31, 1902 (as reported in H. Doc. No. 421, 57th Cong., 2d sess.)	$2,331,005.00
March 3, 1905	200,000.00
March 2, 1907	250,000.00
June 25, 1910	240,000.00
Total appropriated	3,021,005.00
Received from all sources since 1870 (transfer of tugs, sales, etc.)	936.46
Total	3,021,941.46
Transferred to Chicago River from 1907 appropriation	193,000.00
Total	2,828,941.46

CONTRACTS IN FORCE.

None.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS OF CHICAGO, ILL., CALENDAR YEAR 1909.

Season of navigation.—Opened about April 1; closed about December 1.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	208	59,678	1,246,946
Sailing	38	14,376	....
Unregistered motor boats	(a)	(a)	148,126
Total	246	74,054	1,395,072

[a] Unknown.

FREIGHT TRAFFIC.

Actual receipts and shipments by lake at Chicago, Ill., during calendar year 1909 in usual units and in tons of 2,000 pounds, except copper and iron ore, which are in long tons.

Receipts.	Unit.	Quantity.	Shipments.	Unit.	Quantity.
		Tons.			*Tons.*
Lumber	368,562 feet	737,124	Corn	12,435,875 bushels	348,205
Coal	662,431 tons	662,431	Flour	2,584,175 barrels	258,418
Salt	242,634 tons	242,634	Mill stuffs	182,482 tons	182,482
Green fruit	4,748,040 packages	237,402	Wheat	4,305,539 bushels	129,166
Sugar	81,481 tons	81,481	Oats	3,226,000 bushels	51,616
Wheat	1,995,420 bushels	59,863	Oil	22,925 barrels	6,878
Railroad ties	859,585 pieces	42,979	Wool and hair	42,371 sacks	4,237
Iron ore	35,828 tons	35,828	Manufactured iron	3,243 tons	3,243
Cement	16,430 tons	16,430	Grass seeds	3,090 tons	3,090
Telegraph poles	26,141 pieces	13,071	Oil cake	2,810 tons	2,810
Posts	380,178 pieces	9,504	Barley	66,000 bushels	1,584
Copper	4,304 tons	4,304	Lard	3,828 tierces	766
Wood	2,667 cords	4,001	Broom corn	5,247 bales	656
Shingles	16,143,000	4,036	Tallow	1,996 tierces	399
Barley	41,000 bushels	984	Pork	3,991 barrels	399
Lath	5,363,000	536	Rye	10,000 bushels	280
Unclassified	706,899 tons	706,899	Unclassified	370,919 tons	370,919
Total		2,859,507	Total		1,365,148

Comparison of actual receipts and shipments for years 1900 to 1909, inclusive.

Year.	Tons.	Year.	Tons.
1900	5,873,070	1905	5,388,986
1901	6,184,242	1906	5,011,786
1902	5,184,792	1907	4,980,123
1903	6,105,553	1908	4,025,170
1904	4,446,071	1909	4,224,655

K K 2.

IMPROVEMENT OF CHICAGO RIVER, ILLINOIS.

For statement of condition of the river at the time of improvement by the United States (1896), its projects, and general results, see summary, page 783.

During the year contracts were in force as follows:

1. With Great Lakes Dredge and Dock Company, Chicago, Ill., October 28, 1908, for dredging and rock excavation in South Fork, South Branch, and for dredging in North Branch; estimated cost $168,000.

2. With The Fitz Simons & Connell Company, Chicago, Ill., July 8, 1909, for redredging North Branch turning basin; estimated cost $16,320.

3. With Great Lakes Dredge and Dock Company, Chicago, Ill., July 10, 1909, for redredging South Branch turning basin; estimated cost $19,460.

4. With same company, March 9, 1910, for dredging and rock excavation in North Branch below Fullerton Avenue Bridge; estimated cost $27,100.

Under contract No. 1 operations were continued in the South Fork, South Branch, until August 17, and in the North Branch until November 10, when the work was stopped and the contract closed, as the funds available had become exhausted. In the South Fork the rock blasting and removal near Thirty-fifth street (which had been partly finished but not measured at the close of the preceding fiscal year) was completed; 15,464 cubic yards of soft material was dredged and 14,881.9 cubic yards of rock and hardpan removed. In the North Branch 410,823 cubic yards of dredging was done. The total cost of the work at contract prices was $168,439.26, made up as follows: Dredging in North Branch, 573,199 cubic yards, at $0.16 per cubic yard, scow measurement, $91,711.84; dredging in South Fork, 82,029 cubic yards, at $0.33 per cubic yard, scow measurement, $27,069.57. Rock excavation in South Fork: Above grade, 8,486.5 cubic yards, at $4.25 per cubic yard, place measurement, $36,067.63; below grade, 6,395.4 cubic yards, at $2.125 per cubic yard, place measurement, $13,590.22; total for rock excavation, $49,657.85.

Under contract No. 2 dredging of the North Branch turning basin was commenced July 16 and completed October 25. Total dredging 87,974 cubic yards, at $0.17 per cubic yard, making the cost $14,955,58.

Under contract No. 3 dredging of the South Branch turning basin was commenced August 13 and completed October 18. Total dredging 114,237 cubic yards, at $0.175 per cubic yard, making the cost $19,991.48.

Under contract No. 4 operations were commenced April 4, 1910, by removing the soft covering over the rock bottom in the North Branch south of Fullerton avenue, followed by drilling, blasting, and removal of the rock to a depth of 21 feet and to the required width. The work was completed June 29, at a cost of $27,513.71, made up as follows: Dredging 9,390 cubic yards, at $0.35, $3,286.50; rock excavation above grade, 2,795.19 cubic yards, at $5.35, $14.954.27; rock excavation below grade, 3,466.52 cubic yards, at $2.675, $9,272.94.

For the results accomplished under these contracts, see summary, page 783.

Upon complaints received from the navigation interests, soundings were taken at some bridge crossings where the channel had shoaled sufficiently to interfere with the safe passage of vessels, and the shoals were removed.

During the year the Sanitary District of Chicago continued the work of securing a channel of 26 feet mid-river depth and 200 feet width through the South Branch of Chicago River from its mouth to the Drainage Canal entrance.

The widening of the channel has been greatly delayed by lawsuits with owners of the land along the river frontage, which renders it probable that the completion of its project will be indefinitely postponed. This is specially true on that part of the South Branch of the river lying between Adams and Van Buren streets, known as "The Narrows," through which portion navigation is rendered exceedingly difficult and hazardous. In the South Branch, between Twelfth and Eighteenth streets, there was dredged 6,772 cubic yards, and between Twenty-second and Throop streets 103,508 cubic yards of material. From the east arm of the South Fork of the South Branch 57,826 cubic yards of material was dredged. The work of the removal of the by-pass at Adams street was commenced June 30. The excavation of the North Shore Canal, connecting the North Branch of the river with Lake Michigan, at Wilmette, Ill., was continued, and at the close of the year was about 83 per cent completed.

Complaints of vessel men of unreasonable delays at some of the bridges across the river have continued, as in former years. The action in each case has brought only temporary relief, and it is believed that the interests of navigation would be better served if the War Department adopted regulations governing the operation of bridges on this river, as was done on the Calumet River.

Complaints and petitions were received from navigation and commercial interests as to the obstructive character of center-pier bridges in this river which are owned by the city of Chicago. As a result of such complaints, public hearings were held as follows: On May 10, June 10 and 24, 1910, against Jackson Boulevard Bridge across the South Branch; May 20, June 15 and 24, and July 8, 9, and 11, 1910, against Metropolitan Elevated Railroad bridge across the South Branch between Jackson boulevard and Van Buren street. In both cases much evidence was presented by interested parties who are divided as to what length of span should be adopted for bridges across this river. A hearing has also been ordered in regard to the obstructive character of the city highway bridge across the North Branch at Chicago avenue.

As a result of the hearings held on the Indiana and Lake street bridges last year it was ordered by the War Department that the Indiana Street Bridge be removed by May 30, 1910, and the Lake Street Bridge by December 31, 1910.

It is undoubtedly a fact that the commercial development of this river is greatly retarded by reason of the obstructive center-pier bridges now in existence and which are owned by the city of Chicago. This matter has repeatedly been brought to the attention of the city authorities, who recognize the fact that the existence of these bridges forms serious obstructions to navigation, but claim that they are powerless to bring about an improvement of the conditions complained of by reason of the city's financial inability to do the work.

The present condition of the river is shown in the summary, page 783.

The Secretary of War authorized the construction of a new bascule bridge at Indiana street. Bridges were completed by their owners: At Iron street, combined highway and railway, swing; at Kinzie street, railway, swing; at Erie street, highway, bascule; at Polk street, highway, bascule. Bridges were removed by their owners: At Blackhawk street, highway, temporary; at Weed street, highway, temporary; at Fuller street, highway, swing; at Indiana street, highway, swing (partially).

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $34,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total appropriations to December 31, 1902 (as reported in H. Doc. No. 421, 57th Cong., 2d sess.)	$956,457.00
March 2, 1907	300,000.00
March 3, 1909	5,000.00
June 25, 1910	175,000.00
Total appropriated	1,436,457.00
Transferred from Chicago Harbor, 1907, appropriation	193,000.00
Received from sale of earth and old buildings	1,721.12
Total	1,631,178.12

CONTRACTS IN FORCE.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Dredging and rock excavation, about $168,000.
Price per unit: Dredging in North Branch, 16 cents per cubic yard, measured in scows; dredging in South Fork, South Branch, 33 cents per cubic yard, measured in scows; rock excavation in South Fork, South Branch, $4.25 per cubic yard, place measurement.
Date of approval: November 4, 1908.
Date for beginning of work: December 7, 1908.
Date for expiration: Two hundred good working days thereafter.
Completed November 10, 1909.

Name of contractor: The Fitz Simons & Connell Company, Chicago, Ill.
Amount and character of work: Redredging North Branch Turning Basin, about $16,320.
Price per unit: 17 cents per cubic yard, scow measurement.
Date of approval: July 17, 1909.
Date for beginning of work: August 6, 1909.
Date for expiration: Seventy good working days thereafter.
Completed October 25, 1909.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Redredging South Branch Turning Basin, about $19,460.
Price per unit: 17½ cents per cubic yard, scow measurement.
Date of approval: July 28, 1909.
Date for beginning of work: August 15, 1909.
Date for expiration: Eighty good working days thereafter.
Completed October 18, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Dredging and rock excavation in North Branch, about $27,100.
Price per unit: Dredging, 35 cents per cubic yard, scow measurement; rock excavation, $5.35 per cubic yard, place measurement.
Date of approval: March 15, 1910.
Date for beginning of work: April 15, 1910.
Date for expiration: Eighty good working days thereafter.
Completed June 29, 1910.

COMMERCIAL STATISTICS.

The commerce of this river has been reported under the head of Chicago Harbor, of which it is naturally a part.

K K 3.

IMPROVEMENT OF CALUMET HARBOR, ILLINOIS.

For general description of original condition of this harbor, its projects, and general results, see summary, page 787.

All original project work was completed in 1905, leaving only its maintenance.

There was no contract in force during the year for the improvement of this harbor.

The outer breakwater, which had been damaged in scattered places, especially on the southeast extension, by severe storms last fall and winter was repaired by hired labor and purchase of materials. The work was commenced March 15, 1910, and completed in May (including the additional damages caused by the severe storm of April 19), at a total cost of $1,093.82.

May 9 and 10 a survey was made of the Calumet bar (Rockefeller shoal), the soundings indicating but slight changes in depths and contours of the bar. On June 8 an examination was made for indications of rock under the sand and clay, with a view of eventually removing the bar should no rock be found to exist. Twenty-two holes were dug by a dredge in scattered places to depths of between 26 and 28 feet below Chicago city datum. No rock, clay, or even coarse sand was found, but only fine sand which might easily be dredged away. It is estimated that the removal of about 289,000 cubic yards will be required to secure a uniform depth of 26 feet over the bar. As the bar is now marked with a gas buoy, and it has been proposed by the United States Light-House Establishment to install a bell buoy with electrical attachments as a warning to mariners, it seems preferable in the interest of economy to remove the bar entirely.

The inner end of the north pier for a distance of about 1,560 feet consists of cribs sunk on sand bottom between 1870 and 1877, with their bottoms only from 12 to 13 feet below Chicago city datum, while the channel depth is 21 feet; the inner 900 feet of this part of the pier is in a very dilapidated condition and needs immediate rebuilding;

many of the cribs are badly out of level and leaning channelward; in many places the riprap under their front walls has settled, leaving 3 to 7 feet empty space underneath. When this repair work is done, the superstructure should be built of concrete. The breakwater is in good condition, except for slight damage by storms. The outer protected anchorage area and the channel between piers have generally a depth of 20 to 21 feet, though some shoaling has occurred in places.

By the act of Congress, approved June 23, 1910 (Public No. 245), it is unlawful to dump dredged material or refuse of any kind whatever into Lake Michigan, near Chicago, within 8 miles from shore. The act, however, makes no provision for inspection and supervision to see that its requirements are complied with.

October 29, 1909, the Secretary of War granted permission to the Illinois Steel Company to construct and maintain bulkheads and fill solid behind the same in Lake Michigan, immediately north of the mouth of the river, subject to certain conditions, one of which is that the company shall formally convey to the United States, free of cost, full title to an area 150 feet wide and 450 feet long of the area to be reclaimed for future use of the Light-House, Engineer, and Life-Saving services.

Permission was granted to Iroquois Iron Company March 11, 1910, to do similar work on the south side of the entrance to the river.

The automatic water gauge has been in operation during the year, tables of daily and monthly means were constructed, and together with the original record were sent to the Lake Survey Office, Detroit, Mich., as heretofore.

APPROPRIATIONS.

Total appropriations to December 31, 1902 (as reported in H. Doc. No. 421, 57th Cong., 2d sess.)	$1,342,750
March 3, 1903	204,480
March 2, 1907	20,000
June 25, 1910	30,000
Total appropriated	1,597,230
Amount received from sale of property	1
Total	1,597,231

CONTRACTS IN FORCE.

None.

COMMERCIAL STATISTICS.

Actual receipts and shipments by lake at South Chicago, Ill., during calendar year 1909 in usual units and in tons of 2,000 pounds except copper and iron ore which are in long tons.

Receipts.	Unit.	Quantity.	Shipments.	Unit.	Quantity.
		Tons.			*Tons.*
Iron ore	4,652,057 tons	4,652,057	Corn	14,298,901 bushels	400,369
Coal	577,855 tons	577,855	Wheat	4,941,978 bushels	148,259
Wheat	3,560,126 bushels	105,004	Manufactured iron.	53,667 tons	53,667
Lumber	13,658 feet	27,316			
Telephone poles	28,370 pieces	14,185	Flour	481,494 barrels	48,149
Railroad ties	61,150 pieces	3,058	Oil	127,358 barrels	38,207
Wood	1,548 cords	2,322	Oats	1,515,000 bushels	24,240
Posts	29,000 pieces	725	Millstuffs	21,590 tons	21,590
Copper	147 tons	147	Barley	150,000 bushels	3,600
Green fruit	2,500 packages	125	Grass seeds	275 tons	275
Oats	6,000 bushels	96	Oil cake	120 tons	120
Cement	60 tons	60	Tallow	75 tierces	15
Unclassified	3,052 tons	3,052	Rye	35,000 bushels	980
			Wool and hair	8,996 sacks	900
			Unclassified	28,731 tons	28,731
Total		5,386,002	Total		769,102

Comparison of actual receipts and shipments for years 1900 to 1909, inclusive.

Year.	Tons.	Year.	Tons.
1900	3,783,674	1905	4,530,394
1901	3,995,277	1906	5,290,826
1902	4,454,428	1907	6,430,347
1903	4,742,225	1908	5,932,153
1904	3,728,260	1909	6,155,104

K K 4.

IMPROVEMENT OF CALUMET RIVER, ILLINOIS AND INDIANA.

For general description of original condition of this river, its projects, and general results, see summary, page 789.

During the year contracts were in force as follows:

1. With Great Lakes Dredge and Dock Company, Chicago, Ill., May 21, 1908, for dredging between One hundred and twenty-third street and the Forks; estimated cost $108,000.

2. With same company, May 10, 1910, for dredging at and near the Forks and below the Forks; estimated cost $161,385.

Under contract No. 1, operations were continued until September 28, when the work was stopped at a point about 400 feet from the Forks and the contract closed, as the available funds had become exhausted; 234,335 cubic yards of material (of which 21,817 cubic yards was dredged from below grade at half rates) was removed. The total cost of the work at contract prices was $117,322.65, made up as follows: 483,839 cubic yards (above grade) at $0.229, $110,799.13; 56,974 cubic yards (below grade) at $0.1145, $6,523.52.

Under contract No. 2, operations were commenced May 23, 1910, by a hydraulic dredge, working from One hundred and fourteenth street southwardly, the dredged material being deposited on the adjacent bank, except where turning basin No. 3 is proposed to be constructed. On May 26 a dipper dredge was started at One hundred and sixth street, also working southwardly, to deepen the channel to 21 feet up to One hundred and tenth street, this stretch of river never having been dredged to more than 20 feet depth. The first dredge has completed a channel about 1,600 feet long, representing 42,012.5 cubic yards, and the second a channel about 1,400 feet long, representing 43,201.7 cubic yards. This contract is about 12 per cent completed.

During the year negotiations were continued for the acquisition of lands for turning basins and for widening the river above the Forks. The status of this work is reported in the summary, page 789.

Soundings were made and platted at various localities along the river during the year to ascertain the amount of dredging required.

Complaints by vessel men of delays at some of the bridges above the Forks (where boat travel is slight) have continued, as in former years. The action taken in each case has brought temporary relief, but no permanent correction of the abuse.

A public hearing was held on October 29, 1909, in regard to the obstructive character of the three railroad bridges near Ninety-sixth street, which are owned by the Baltimore and Ohio, the Pennsylvania, and the Lake Shore and Michigan Southern Railway companies. These bridges are of the center-pier type; they are placed very close together, and cross the stream at an angle, so that a vessel going up or down the river, when reaching these bridges, is obliged to make a sharp S curve in order to get safely through. As a result of the hearing the Secretary of War caused notices to be served upon the owners of the bridges requiring them to remove the existing draw bridges, together with the center piers and shore abutments thereof, to a depth of 22 feet below Chicago city datum; straighten and widen the draw channel; substitute bridges of the bascule or vertical lift type providing either a clear channel not less than 140 feet in width with head room of 16.5 feet, or two parallel channels of 90 feet clear width separated by a center rest pier not more than 20 feet wide. Two years from date of service of notices is the time limit given within which the alterations must be made. No agreement has as yet been reached as to which plan will be adopted.

Bridges were authorized by the Secretary of War at mile 5.39, railroad, bascule; at mile 10.55, highway, bascule, Hohman street, Hammond, Ind. Bridges were completed by their owners at mile 10.35, railroad, bascule.

The case of the United States *v.* the Sanitary District of Chicago, wherein the latter seeks to reverse the flow of Calumet River so as to cause the water to flow from Lake Michigan into the Drainage Canal (in a similar manner as has been done in Chicago River), is still pending in the United States circuit court at Chicago. A permit for this work was given by the Secretary of War, June 30, 1910, upon certain conditions, one being that the total flow through the Calumet and Chicago rivers shall not exceed the present permitted flow through the Chicago River (250,000 cubic feet per minute); another that the above-mentioned suit shall in no wise be affected by the issuance of the permit.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total appropriations to December 31, 1902 (as reported in H. Doc. No. 421, 57th Cong., 2d sess.)	$485,000.00
April 28, 1904 (allotted May 31, 1904)	41,718.98
March 3, 1905	100,000.00
June 30, 1906	156,000.00
March 2, 1907	191,500.00
March 4, 1907	20,000.00
May 27, 1908	140,000.00
March 3, 1909	30,000.00
June 25, 1910	98,000.00
Total	1,262,218.98

CONTRACTS IN FORCE.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Dredging, about $108,000.
Price per unit: 22.9 cents per cubic yard, place measurement, to 17 feet depth; 11.45 cents per cubic yard, place measurement, at depths over 17 feet, but not exceeding 19 feet.
Date of approval: June 2, 1908.
Date for beginning of work: June 19, 1908.
Date for expiration: Two hundred good working days thereafter; extended for a reasonable period; extension expires September 29, 1909.
Completed September 28, 1909.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Dredging, about $161,385.
Price per unit: At and near the forks, 22.8 cents for material deposited on shore or 27 cents in the lake, per cubic yard, place measurement; below the forks, 23.5 cents for material deposited on shore or 27.5 cents in the lake, per cubic yard, place measurement.
Date of approval: May 13, 1910.
Date for beginning of work: June 1, 1910.
Date for expiration: Three hundred good working days thereafter.

COMMERCIAL STATISTICS.

The commerce of this river has been reported under the head of Calumet Harbor, of which it is naturally a part.

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[a] Exclusive of the balance unexpended July 1, 1910.

KK 5.

IMPROVEMENT OF INDIANA HARBOR, INDIANA.

For general description of this harbor, see summary, page 792.

The river and harbor act of June 25, 1910, contained the following item:

> Indiana Harbor, Indiana: For improvement and maintenance in accordance with the project recommended in House Document Numbered Eleven hundred and thirteen, Sixtieth Congress, second session, sixty-two thousand dollars: *Provided*, That no part of this appropriation shall be expended until the Secretary of War shall be satisfied that the conditions specified in said document have been fully complied with.

The project recommended in House Document No. 1113 is the completion and maintenance of a 22-foot channel in the outer harbor, the width and depth to be gradually increased from the ends of the piers out to deep water in the lake.

The cost of securing such a channel 300 feet wide and opening out at the lake end to facilitate entrance of boats was estimated at $62,000.

The condition referred to in the appropriation act is stated in House Document No. 1113, as follows:

> No work on any part of either outer or inner harbor shall be commenced by the United States until after the channel way of such part shall have been deeded to and accepted by the United States.

Deeds covering a channel way 300 feet wide for the outer harbor and 200 feet wide for the inner harbor were made to the United States July 5, 1888, and were recorded April 15, 1889, but there is no evidence that the deeds were accepted by the United States. These deeds, together with abstracts of title brought down to the present time, maps, etc., have been tendered by the parties in interest for acceptance by the United States.

When such deeds have been accepted it is proposed to expend the funds appropriated and those asked for the fiscal year ending June 30, 1912, in accordance with the above project, and for maintenance.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

June 25, 1910	$62,000

CONTRACTS IN FORCE.

None.

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[a] Exclusive of the balance unexpended July 1, 1910.

K K 6.

IMPROVEMENT OF MICHIGAN CITY HARBOR, INDIANA.

For general description of original condition of this harbor, its projects, and general results, see summary, page 793.

The work under former projects is considered closed since the approval of the project of July 27, 1908, called for by public resolution of Congress approved May 13, 1908 (Public No. 23), the details of which are given in the summary, page 793.

During the year contracts were in force as follows:

1. With Standard Construction Company, Chicago, Ill., January 6, 1909, for construction of new pier and removal of old pier; estimated cost, $58,335.46.
2. With Great Lakes Dredge and Dock Company, Chicago, Ill., May 26, 1909, modified by supplemental contract dated July 17, 1909, for rectangular crib at northerly end of outer breakwater; estimated cost, $14,000.
3. With same company, June 28, 1909, for repairs to outer breakwater and removal of overturned crib; estimated cost, $26,000.
4. With same company, January 22, 1910, for dredging between the old and new piers, etc., estimated cost, $10,915.

Under contract No. 1, work was continued, with frequent interruptions from severe northerly winds, until December 15, when operations were suspended for the season. Up to that date 600 linear feet of the new pier had been built in continuation of the inner end of the old westerly pier, and 500 linear feet of the latter had been removed. The contractors could have removed more of the old pier, but this work was ordered stopped in November until the shore end of the new pier should be completed, as it was feared that westerly winds through the opening would cause a strong current, with the result that the sand between the old and new piers would run into and fill up the main river channel. A special effort was made to complete the new pier up to the shore line, but this was prevented by the weather.

March 21, 1910, the contractors, the Standard Construction Company, sold their plant to The Fitz Simons & Connell Company, of Chicago, whose intention was to complete the unfinished work of the contract. Accordingly operations were resumed April 30, but suspended the next day owing to a strike of the pile-driver crew. April 30 a receiver was appointed for the Standard Construction Company, and on June 4 the court, by a formal order, subrogated the bonding company to all the rights and duties of the Standard Construction Company. The bonding company then entered into an agreement with The Fitz Simons & Connell Company to complete the work contracted for, at the same unit prices which had been bid by the Standard Construction Company and accepted by this office. The work on the new pier was resumed June 28, and some of the rear sheeting was driven. The work contemplated is about one-half done, but the contract can not be completed until the land needed for widening the channel has been acquired by the United States. Deeds for this land were tendered by the city authorities of Michigan City on December 1, 1909, but were not considered as vesting a valid title, and it was recommended that the Department of Justice cause condemnation proceedings to be instituted on behalf of the city of Michigan City in the name of the United States.

Under contract No. 2, a rectangular crib 100 by 30 feet, with the base 34 feet wide and 26.5 feet in depth, was constructed at Gary, Ind., and towed to Michigan City Harbor, where it was sunk in place on a stone foundation previously prepared for that purpose at the northeasterly end of the breakwater, filled with stone, covered with decking, and riprap placed on both sides to within 14 feet of the water level. The work was completed September 20, at a total cost of $14,071.26.

Under contract No. 3, work was commenced July 28; the overturned crib was removed with its stone filling to a depth of 22 feet and 566.3 cords of stone were placed in the southwesterly end of the breakwater and as riprap on the lakeward side of it at that end. Much time was lost on account of unfavorable weather. The work was completed December 10, at a total cost of $26,906.94.

Under contract No. 4, work was commenced May 6 and a channel of about 60 feet width and 18 feet depth was secured by the removal of 24,398 cubic yards of material, which was deposited in the lake west of the harbor entrance. In addition, 9,280 cubic yards was dredged from the trench alongside of the new pier, to enable a floating pile driver to enter the site for the new pier and place the mud sills prior to driving the sheeting under contract No. 1. Further work was postponed pending the closing of the gap in the new pier at the shore end. The completion of this contract is also dependent upon the acquisition of the land for widening the channel. This contract is about 33 per cent completed.

A statement of the condition of the existing works is given in the following extract from report of Assistant Engineer G. A. M. Liljencrantz:

> The channel from the Lake to Franklin Street Bridge is such that a vessel drawing 15 feet of water can pass through, but the sides are shallow, and dredging is to be done under existing contract during the present season.
>
> The detached breakwater is in good condition, though about 300 linear feet of the southwesterly end has settled some 3 to 4 feet, owing to scouring of the fine sand along the lake face, which has caused the stone foundation to settle. The stone filling has also settled in many places.
>
> The new 100-foot-long crib sunk at the northeasterly end of the breakwater last season is in a very good condition, in good level and alignment.
>
> The easterly harbor pier, from its outer end to a point about 530 feet north of its junction with the old easterly or basin breakwater, is in good condition, but the superstructure over the said 530 feet is in an extremely dilapidated condition, and in spots all broken up. As this pier forms the support for the elevated walk leading to the United States light-house at the end of this pier, it is of greatest importance that this superstructure should be rebuilt at an early date. Southwardly from the old breakwater the east pier is in good condition to the United States life-saving station. A part of this end of the pier consists of a sheeting on the channel side, and this would be dangerously exposed to destructive seas if the breaks in the old east breakwater should be enlarged by storms to any considerable extent, which is not unlikely, unless the now existing breaks are repaired.
>
> The outer end of the easterly pier, where the light-house is located, is exposed to the heaviest seas, with a sweep of some 300 miles of the lake, and there is a constant current around this end of the pier, causing a scouring of the fine sand bottom, which in turn draws out the stone filling from the crib. Thus the light-house might be in a precarious situation if this happens in the winter when there is no possibility of replacing lost stone filling. A steel sheeting,

similar to that under contract to be placed along the breakwater, would probably effectively prevent the scouring at this place.

The outer portion of the westerly harbor pier, which is to remain, is generally in good condition. The inner portion, now under contract to be removed, is in bad condition, and so is the old easterly breakwater.

On June 24, 1910, the bascule highway bridge across the inner harbor at Franklin street was run into by the steamer *United States* and knocked into the river channel, blocking navigation. Action has been taken toward securing the removal of the obstruction.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $23,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total appropriations to December 31, 1902 (as reported in H. Doc. No. 421, 57th Cong., 2d sess.)	[b] $1,536,638.92
1878 (allotment)	2,500.00
March 3, 1905	45,000.00
March 2, 1907	60,000.00
March 3, 1909	40,500.00
March 3, 1909 (allotted Apr. 17, 1909)	20,000.00
March 3, 1909 (allotment May 12, 1910)	12,200.00
June 25, 1910	65,500.00
Total appropriated	1,791,338.92
Miscellaneous receipts	4,130.00
Total	1,795,468.92

CONTRACTS IN FORCE.

Name of contractor: Standard Construction Company, Chicago, Ill.
Amount and character of work: Pier construction and removal, about $58,400.
Price per unit: Oak piles 35 feet long, $12.50 each; oak piles 30 feet long, $11 each; oak cap timbers, $78 per thousand feet b. m.; oak timber, $85 per thousand feet b. m.; Oregon fir stringers, $55 per thousand feet b. m.; Oregon fir or pine triple-lap sheet piling 28 feet long, $13 per linear foot; Oregon fir or pine double-lap sheet piling 20 feet long, $55 per thousand feet b. m.; steel anchor rods, 5 cents per pound; screw bolts, 5½ cents per pound; driftbolts, 4¾ cents per pound; wire nails, 5 cents per pound; boat spikes, 5 cents per pound; removal of old pier, $17 per linear foot.
Date of approval: January 14, 1909.
Date for beginning of work: April 15, 1909.
Date for expiration: For new pier, one hundred good working days; for old pier, one hundred and fifty good working days thereafter.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Placing crib, outer breakwater, about $14,000.
Price per unit: Hemlock timber, $25 per thousand feet b. m.; yellow pine decking, $40 per thousand feet b. m.; driftbolts, rods, etc., 3 cents per pound; screw bolts, 6 cents per pound; stone ballast and riprap, $7.50 per cord of 128 cubic feet; five days' use of dredging outfit, lump sum of $1,500.

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Of the appropriation of August 30, 1852, $5.15 was carried to surplus fund.

Date of contract: July 17, 1909.
Date for beginning of work: August 7, 1909.
Date for expiration: Thirty good working days thereafter.
Completed September 20, 1909.
(This contract is supplemental to and supersedes that of May 26, 1909, for placing octagonal crib.)

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Repairs to outer breakwater and removal of overturned crib, about $26,000.
Price per unit: Yellow pine timber, $60 per thousand feet b. m.; yellow pine decking, $50 per thousand feet b. m.; steel driftbolts, 5 cents per pound; iron spikes, 5 cents per pound; stone filling and riprap, $7.90 per cord of 128 cubic feet; removal of overturned crib, lump sum of $1,500.
Date of contract: June 28, 1909.
Date for beginning of work: July 8, 1909.
Date for expiration: Seventy good working days thereafter.
Completed December 10, 1909.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: Dredging, about $10,915.
Price per unit: Dredging, 10.9 cents per cubic yard, scow measurement; removal of wreckage, $15 per thousand feet b. m.
Date of contract: January 22, 1910.
Date for beginning of work: April 15, 1910.
Date for expiration: Seventy good working days thereafter.

COMMERCIAL STATISTICS OF MICHIGAN CITY, IND., CALENDAR YEAR 1909.

Season of navigation.—Opened about April 1; closed about December 1.

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	53	17,559	189,967
Sailing	7	1,920	
Unregistered:			
Motor boats	5	34	2,244
Total	65	19,513	192,211

FREIGHT TRAFFIC.

Actual receipts and shipments by lake at Michigan City, Ind., during calendar year 1909 in tons of 2,000 pounds.

Receipts.	Unit.	Quantity.	Shipments.	Unit.	Quantity.
		Tons.			*Tons.*
Lumber	7,751,297 feet	15,502	Merchandise	196 tons	196
Salt	20,560 barrels	2,878	Firewood	56 cords	84
Merchandise	1,587 tons	1,587			
Wood pulp	550 cords	385			
Shingles	350,000 pieces	88			
Firewood	56 cords	84			
Total		20,524	Total		280

Registered tonnage of vessels entered	486, 505
Registered tonnage of vessels cleared	489, 614
Total freight (tons) carried in—	
1905	91, 910
1906	89, 170
1907	66, 125
1908	33, 448
1909	20, 804

K K 7.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

(*a*) *Lighter York State, West Fork, South Branch of Chicago River near Ashland avenue.*—Reported as dangerous to navigation in this part of the river; was raised, towed out into Lake Michigan and sunk in deep water at a total cost to the United States of $1,200.

(*b*) *Gospel ship A. G. Morey, in North Branch turning basin, Chicago River.*—Abandoned by owners; was destroyed and débris removed from channel at a total cost to the United States of $1,599.83.

(*c*) *Lighter O. J. Hale, in North Branch Canal of Chicago River near Weed street.*—Abandoned by owners; was raised and then towed out to deep water in Lake Michigan, where it was sunk, at a total cost to the United States of $959.67.

(*d*) *Schooner Maryette, in Calumet River near One hundred and first street.*—Reported as an obstruction to navigation by vessel owners; was destroyed and débris removed from river channel at a total cost to the United States of $173.

APPENDIX L L.

IMPROVEMENT OF RIVERS AND HARBORS IN THE SECOND CHICAGO, ILLINOIS, DISTRICT.

REPORT OF MAJ. CHARLES KELLER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Illinois River, Illinois.
2. Operating and care of La Grange and Kampsville locks, Illinois River, and approaches thereto.
3. Illinois and Mississippi Canal.
4. Operating and care of Illinois and Mississippi Canal.

United States Engineer Office,
Chicago, Ill., July 20, 1910.

Sir: I have the honor to transmit * * * annual reports covering works in my charge at Chicago, Ill., for the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

Charles Keller,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

L L 1.

IMPROVEMENT OF ILLINOIS RIVER, ILLINOIS.

(A) BELOW COPPERAS CREEK.

In its original and natural state the Illinois River from its mouth to Copperas Creek was navigable in ordinary and high water stages for the largest class of steamboats used on the Mississippi River in the early days; but at low water or in the dry seasons it could not be used at all, or only by the smallest class of flat-bottomed boats capable of carrying scarcely any cargo whatever. (House Ex. Doc. No. 16, 40th Cong., 1st sess.) Early state efforts for improvement were based upon a navigable depth of 4 feet, which was not actually available at all seasons, and moreover navigation was impeded by snags and bars.

Work during the fiscal year has consisted in inspection of the river, repairing and building plant, dredging, and snagging.

During the year the headquarters of the fleet were moved from Beardstown to Peoria; the storehouse, shop, and oil house have been set up on the bank at Peoria, and a harbor dredged to lay boats in and piling driven for anchorage purposes.

The approved project provides for a channel 200 feet wide and 7 feet deep at low water of 1879. Dredging was done on this section of the river, at miles 26 and 32. A cut 800 feet long was made at mile 26, between Hurricane and Diamond islands, 13,573 cubic yards of mud being removed. This is the fourth time this bar has been dredged in the past sixteen years. The work at mile 32 was in the entrance to Kampsville lock. A cut 2,000 feet long was dredged, 16,510 cubic yards of mud being removed. One day's dredging was done at the landing of the Eagle Packet Company at Alton, 614 cubic yards being removed. Six days' dredging was done at the landing at Peoria, where 1,695 cubic yards of mud were removed and 9 piles pulled. The work at Alton and at Peoria was paid for by the interested parties.

The cost per yard of the dredging, including all repairs to plant during the year is 14.7 cents.

During inspection trips 27 snags were removed, and 150 tons of stone were towed from Kampsville lock to the mouth of the Illinois and Mississippi Canal.

Repairs were made to dredge *No. 1* and dredge *No. 2*, steamers *Pearl* and *Fox*, barges *Nos. 1*, *6*, *7*, office boat, quarter boat, floating shop, and dump scows. An 8-inch centrifugal pump was set up on an old steamer hull for use in removing mud from around lock gates, and various repairs were made to machinery.

The amount of commerce on the river this year was a little less than for the past two or three years, owing to the fact that the river was closed by ice much longer than in other years, and to the further fact that one boat burned in August, 1909, and could not be replaced in time for last season's business. The owners of the burned boat have built a new one, which will make her first trip July 3, 1910.

Two small towboats entered the river trade in July, 1909, handling principally fresh-water clam shells and grain.

The following table gives the commercial statistics for the upper and lower river, as far as obtainable; boat owners do not aways reply to letters of inquiry. The freight movement indicated below is probably one-third too small, and the excursion and passenger business one-half lower than that actually carried on:

Thirty-one registered steamers; net registered tonnage, 4,520; carrying 45,800 passengers.

Fifty-three registered launches; net registered tonnage, 720.

One thousand two hundred unregistered power boats; 80 per cent of these unregistered power boats are engaged in catching fresh-water clams. There are no sailing vessels on the river, and all boats are necessarily American boats.

Freight traffic.

Article.		Quantity.	In short tons.	Valuation.	Rate per ton-mile.	Average haul.
						Miles.
Merchandise	tons	12,970	12,970	$324,000	$0.03½	75
Live stock	head	34,360	3,900	651,000	.06	80
Grain	bushels	1,295,850	23,800	839,600	.01½	50
Apples	barrels	5,690	427	11,400	.06	70
Logs	feet b. m.	2,350,000	7,050	16,500	....	50
Shells	tons	4,040	4,040	60,000	.03	40
Coal	do	7,017	7,017	15,000	.01½	75
Total		....	59,200	1,917,500	....	....

At Henry and Copperas Creek boats pass over the dams for more than one-half of the season and no record of this business is obtained by the collectors. The accompanying table shows the arrivals and departures of boats at St. Louis for the calendar year 1909.

(B) FROM COPPERAS CREEK TO LA SALLE.

In its original and natural state the Illinois River from Copperas Creek to La Salle afforded navigation in times of high water to boats of not exceeding 4 feet draft, but such navigation was always uncertain. As early as 1849 the St. Louis and Naples Packet Company is said to have begun a regular packet business on the river. At times of low water and in dry seasons the river between Copperas Creek and La Salle was not navigable for commercial purposes at all. Thus the fluctuations of stage was the controlling factor in the navigation of this river until its improvement by slackwater insured navigable conditions at low water in dry seasons.

The first appropriation for this stretch of the river was made by the river and harbor act of March 2, 1907, thus definitely placing the whole river from its mouth to La Salle under United States jurisdiction. Project for the improvement was approved by the Department April 6, 1907, the appropriation of $50,000 to be expended for the general purpose of securing and maintaining a depth of 7 feet at low water of 1901, with 200 feet width.

On June 30, 1909, a minimum depth of 7 feet at mean low water was available throughout the length of the river under improvement; that is, from its mouth to La Salle, which is at present the head of navigation. The available width is from 160 to 200 feet. The total length of this navigable portion of the river, from its mouth to La Salle, is about 224 miles. The fluctuation in stage from low water to flood stage is upward of 15 feet.

Work of inspection, maintenance, and preparation of plant has been done in connection with work on the lower river. A 7-foot navigable depth has been maintained at all times during the year.

Dredging was done at miles 161 and 162 and at mile 196; miles 161 and 162 include the point at Peoria, below the mouth of Farm Creek, which had been complained of. This bar was 3,500 feet long, and 39,614 cubic yards of sand, gravel, and mud were removed and deposited in Peoria Lake, about 1 mile distant. The work at mile

196 was in the lower entrance of Henry lock. A cut 400 feet long was dredged, 6,335 cubic yards being removed.

The bank protection being built by the Peoria and Pekin Traction Company at Pekin, under a permit from the Secretary of War dated June 4, 1908, is nearly completed.

Work has been progressing on the bridge of the Peoria and Pekin Union Railroad bridge at Peoria, under permit of the Secretary of War dated April 28, 1909, 2 abutments and 4 piers being finished.

A new contract has been let for removal of a part of the Peoria highway bridge, which failed and fell into the river, as reported last year.

A permit was granted by the Secretary of War December 23, 1909, for a highway bridge at Lacon, but the work has not been started, and the time limit expired June 1, 1910.

A permit was granted by the Secretary of War September 2, 1908, for a wharf at Peru, but the work has not been begun.

A permit was granted September 22, 1908, for a highway bridge at Ottawa, Ill., and the bridge is practically completed.

The work of inspection, maintenance, and preparation of plant has been done in connection with the work on the lower river.

Certain drainage commissioners having petitioned for a permit to close the entrance to Spring Lake in Tazewell County, to which petition opposition developed, a public hearing was ordered, and was held on February 9, 1910, at Peoria. At this hearing it developed that the question at issue was also the subject of litigation in the state courts. Report and recommendation in the matter of the petition has been therefore reserved until such time as a decision in the state courts shall have been reached.

A company has been organized to put a large excursion boat in the river trade out of Peoria, and it is understood the first trip is scheduled for July 2, 1910.

A contracting company at Peoria has chartered a steamer, purchased barges, and started to do a sand and gravel business, pumping the material out of the river. A small excursion steamer, licensed to carry 100 passengers and doing business out of Peoria, was sold, and has left the river.

For some time a suit brought by a boat owner against the Chicago, Burlington and Quincy Railroad, in an effort to force the railroad company to convert its fixed bridge at La Salle, has been pending in the state courts. A decision adverse to the boat owner has recently been rendered in the lower court. La Salle is at present considered the head of navigation on the Illinois River.

The commercial movement for the whole river is given above and in accompanying table. A special report upon the traffic of this river was made on September 25, 1909.

PROPOSED APPLICATION OF FUNDS.

It is proposed to apply the available funds on both divisions of the river to securing and maintaining a navigable channel of 7 feet depth and 200 feet width from the mouth of the river to La Salle, to maintaining and rebuilding plant, removing snags and other obstructions, making such local surveys as may become necessary from time to time, and dredging a channel from Lake Depue.

APPROPRIATIONS.

BELOW COPPERAS CREEK.

June 30, 1880, available from previous appropriations	$38,337.81
June 14, 1880	110,000.00
March 3, 1881	250,000.00
August 2, 1882	175,000.00
July 5, 1884	100,000.00
August 5, 1886	112,500.00
August 11, 1888	200,000.00
September 29, 1890	200,000.00
July 13, 1892	100,000.00
August 18, 1894	35,000.00
June 3, 1896	$40,000.00
March 3, 1899	100,000.00
June 13, 1902	75,000.00
March 2, 1907	50,000.00
June 25, 1910	30,000.00
	1,615,837.81
Received from all other sources	1,112.85
Total	1,616,950.66

COPPERAS CREEK TO LA SALLE.

March 2, 1907	$50,000.00

Arrival and departure of steamboats and barges at St. Louis, Mo., via Illinois River, calendar year 1909.

Month.	Arrivals.	Departures.
March	7	8
April	9	8
May	15	11
June	12	11
July	10	10
August	16	13
September	23	19
October	16	16
November	9	8
December	2	2
Total	119	106

Receipts, 9,695 tons; shipments, 5,775 tons.

L L 2.

OPERATING AND CARE OF LA GRANGE AND KAMPSVILLE LOCKS, ILLINOIS RIVER, AND APPROACHES THERETO.

These locks and dams have been maintained and operated under the indefinite appropriation provided by section 4 of the river and harbor act of July 5, 1884, as amended by section 6 of the river and harbor act of March 3, 1909.

The lock at La Grange was closed to navigation from December 5, 1909, to March 7, 1910. The spar track platforms and lock gates were painted, mud removed from around lock gates, some grading done, one clump of piles driven above upper end of river wall, and windmill repaired. Forty piles were cut and hauled and 90 tons of ice harvested.

At Kampsville the lock was also closed to navigation from December 5, 1909, to March 7, 1910. From March until June 15 nearly all boats passed over the dam. The spar track platforms were painted; lock gates were painted above low water; 200 feet of flashboards were raised; two clumps of fender piling were driven above river wall; one barge of rock was loaded for the Illinois and Mississippi Canal.

Accompanying tables show the amount of commerce passing both locks during the fiscal year.

LA GRANGE LOCK.

	Commercial boats.		United States and State.		Unregistered power boats.		Total.
	Up.	Down.	Up.	Down.	Up.	Down.	
Boats passing	268	240	33	33	811	884	2,269
Steamers.....number	238	231	33	33			535
Do.....tons	38,356	37,837	4,059	4,059			84,311
Barges.....number	380	220	16	16			632
Do.....tons	46,166	42,055	2,380	2,380			92,981
Launches.....number	30	28					58
Do.....tons	380	315					695
Merchandise.....do	1,631	981	150				2,762
Passengers.....number	1,452	1,438					2,890
Live stock.....head	177	2,080					2,257
Grain.....tons	8,848						8,848
Apples.....do	217						217
Logs.....do	7,050						7,050
Coal.....do	1,202		5,815				7,017
Shells.....do	3,018						3,018
Staves.....do	900						900

KAMPSVILLE LOCK.

Boats passing	267	272	18	16	969	908	2,450
Steamers.....number	211	209	18	16			454
Do.....tons	49,517	43,047	3,054	2,590			98,208
Barges.....number	152	148	12	11			323
Do.....tons	27,132	26,702	1,750	1,450			57,034
Launches.....number	66	63					129
Do.....tons	668	667					1,335
Merchandise.....do	4,890	1,276					6,166
Passengers.....number	4,868	4,474					9,342
Live stock.....head	761	26,549					27,310
Grain.....tons	1,632	916					2,548
Apples.....do	154	210					364
Logs.....do	4,785	84					4,869
Shells.....do	2,006	1,019					3,025
Staves.....do	900						900
Coal.....do		2,530					2,530

PROPOSED APPLICATION OF FUNDS.

The funds to be allotted will be used for ordinary maintenance, operation, repairs, contingencies, etc.

Summarized statement of expenses from appropriation for operation and care of canals and other works of navigation (indefinite) applied to La Grange and Kampsville locks, Illinois River.

La Grange lock:		
Services	$6,706.79	
Materials	755.18	
Travel expense	11.69	
Total		$7,473.66

Kampsville lock:		
Services	$6,176.45	
Materials	191.39	
Subsistence	446.50	
Supplies	486.87	
Travel expense	36.74	
Telephone	28.60	
Total		$7,366.55
Grand total		14,840.21

L L 3.

CONSTRUCTION OF ILLINOIS AND MISSISSIPPI CANAL.

At the close of the last fiscal year the work remaining to be done on construction of the canal consisted of blasting and dredging in Rock River pool, completing houses, grading, ditching, improving towpath, and miscellaneous items which had been left over during construction for the reason that they could be better done after the canal had been watered.

At the beginning of the fiscal year the construction of a house on mile 1 of the feeder had been commenced. This house was completed during the year, barn built, and ground graded. A pump house of concrete was constructed at the guard lock, a steel tower being erected over same and a wooden tank placed on top. A gasoline engine and pump were installed and pipe connections made with the well and tank and with office building.

On the western section houses at Locks 23, 25, and on miles 29, 35, 43, and 48 were painted, and a barn built at house on mile 29. Work was commenced on a concrete bridge at Aqueduct 8. The cutting of concrete of the piers was done and gravel, cement, and steel delivered for construction work. Forming for five bays was erected and concrete deposited therein.

On the eastern section a lock house was built at the emergency gate. Seven houses were painted two coats and 12 houses one coat. Twenty barns were built and painted. A tool house was built at Lock 9 and a blacksmith shop at Lock 19. Some small repairs of older houses were made. A house boat for use of lockman at Lock No. 1 was built at the Milan boat yard.

Rock River pool.—The pool is that portion of Rock River, about 8.7 miles in length, extending between Lock No. 29 of the western section and Lock No. 35 of the Milan section of the canal. An examination of this pool, made in June, 1901, showed a navigable depth of 7 feet extending about 5.3 miles from Lock No. 35 to Case Creek and of only about 3 feet at various points through the remaining portion of the pool.

Detailed surveys of the pool and bottom lands adjoining were made in 1901 and 1905 and estimates rendered upon various plans with widths of channel ranging from 80 to 300 feet, and upon raising the pool level to avoid excavating rock and other materials in the river.

It was finally determined that a steamboat channel through the pool could better be obtained by excavating in the river bed than by raising the pool level and obtaining flowage rights on adjoining land.

Prior to 1907 the work consisted chiefly in clearing the stream and banks of snags and leaning trees besides a little dredging in 1903 in the vicinity of Hilliers Islands.

Under a project dated December 3, and approved December 14, 1906, operations were finally begun in April, 1907, with a view to obtaining a channel 80 feet wide with a depth of 5 feet with the pool surface at an elevation of 131 (Hennepin datum) by excavating material from the river bed. Drilling and blasting operations covered only such portions of rock as were found to be above 5 feet depth, and dredging where necessary to obtain 5 feet was carried to 7 feet where solid rock did not intervene. The $20,000 allotted was expended in 1907 and a temporary 80-foot channel obtained.

This channel, however, proved to be too narrow and crooked and operations were again resumed in September, 1908, and continued during working seasons to date. At the present time a channel is proposed having a width of 200 feet with a navigable depth of 7 feet.

During the past year an area of 221,811 square feet was drilled and blasted, depths varying from 1 to 4 feet, comprising 19,134 solid cubic yards of hard clay and limestone. An area of about 400,000 square feet was dredged over with dipper dredges and reduced to the required grade. The dredged material amounted to 65,907 cubic yards and was loaded on barges and dump boats, the best of it transferred to the canal east of Lock 29, where it was used for riprap on the canal banks, and the balance wasted.

An area of about 650,000 square feet was covered by one 10-inch suction dredge, *Geyser*, removing sand and gravel in varying depths from 1 to 7 feet, comprising 114,933 cubic yards. This material was carried by a 12-inch discharge pipe from the dredge toward the shore and deposited with a view to placing it well away from the channel, closing side chutes and helping deflect the ordinary flow of the river through the new channel.

Between July 1 and November 19, operations were continued, principally between Lock No. 29 and the foot of Andersons Island. The floating plant was laid up at the Milan boat yard about November 19, where it was repaired during the winter. Operations were resumed about April 1, 1910, continuing to the end of the fiscal year at both Hilliers Crossing and vicinity of Lock 29.

Between Lock 29 and the foot of Andersons Island the drilling and blasting is practically completed and a channel varying in width from 75 to 200 feet with a depth of 7 feet has been obtained.

At Hilliers Crossing the required drilling and blasting is about two-thirds finished and an 80-foot channel to the required 7-foot grade has been obtained, It is expected to continue this crossing, as well as the remaining work below Lock 29, early in September. The remaining rock excavation below Hillier's Crossing can be removed before the end of the present working season with the plant now employed, but it is thought that the sand excavation can not be completed at that time without the employment of an additional suction dredge.

A survey of the pool was made in September, 1909. Sounding lines crossing the pool were spaced, usually 200 feet apart, except at crossings where rock was found above grade, when soundings were taken 20 feet apart.

Coal is mined in many places along the pool and plans are under way to transport much of it by water. During the fiscal year the traffic in the pool consisted of 57 commercial boats carrying 3,505 passengers, and 117 barges with 1,323 tons of merchandise, coal, etc.

DISTRIBUTION OF CHARGES FOR CONSTRUCTION OF ILLINOIS AND MISSISSIPPI CANAL FOR FISCAL YEAR ENDING JUNE 30, 1910.

House at Lock 2	$255.26
House at Lock 3	182.12
House at Lock 4	201.00
House at Lock 5	205.00
House at Lock 6	166.62
House at Lock 7	191.62
House at Lock 8	206.12
House at Lock 9	50.58
House at Lock 10	163.62
House at Lock 11	187.94
House at Lock 12	154.62
House at Lock 13	172.62
House at Lock 14	180.99
House at Lock 15	199.24
House at Lock 16	196.62
House at Lock 17	221.36
House at Lock 18	290.01
House at Lock 19	8.91
House at Lock 20	274.37
House on mile 9	207.54
House on mile 15	$192.32
House on mile 16	123.31
House on mile 26	64.90
Lock house mile 35	9.28
Lock house mile 48	26.66
House at Lock 23	27.82
House on mile 24, eastern section	2,197.05
House at Lock 27	7.22
House on mile 1, feeder	1,581.54
Guard lock	650.07
House boat for Lock 1	956.27
Bridge at aqueduct 8	675.46
House on mile 29 (30), western section	187.28
Rock River pool	47,519.38
Expended during the year	57,934.72

PROPOSED APPLICATION OF FUNDS.

It is proposed to apply the funds available to completing the canal by deepening the outlet into Rock River and the Rock River pool, completing houses, reenforcing banks where necessary, revetting banks, and strengthening points which experience shows to be vulnerable, and miscellaneous work upon towpath, ditches, etc.

In addition to the above, it may be found necessary to make provision for certain work for which no funds are now available, namely, raising aqueduct 1, Lock 4, one highway bridge and approaches, and the banks of the canal to relieve the situation where the canal crosses East Bureau Creek just below the Chicago, Rock Island and Pacific Railway bridge across the same stream. The bed of Bureau Creek has filled and the clearance under the aqueduct is now too low. The situation may become critical, as an ice gorge might flood the railroad tracks and put the Rock Island System out of business at this crossing for a week or more. The railway company is in no way responsible for this, and has requested that the Government provide a satisfactory remedy for the situation.

The necessity for a new appropriation of funds for this purpose is explained by the fact that the trouble has resulted from conditions originating since this portion of the canal was built. For a number of reasons the bed of Bureau Creek has been rising since this aqueduct was built. Soil wash owing to increased cultivation of the drainage area, as well as an increased stage in the Illinois River below, owing to the added flow from the sanitary canal of Chicago, are probably the most important of the changed conditions responsible. It is believed that a lowering of the creek bed by dredging would provide but temporary relief and would have to be repeated from time to time, and that the raising of the aqueduct would permanently dispose of the trouble.

APPROPRIATIONS.

July 1, 1890, balance unexpended from previous appropriations	$786.46
Act of—	
September 19, 1890	500,000.00
July 13, 1892	500,000.00
August 17, 1894	190,000.00
June 3, 1896	45,000.00
Sundry civil act of—	
June 4, 1897	875,000.00
July 1, 1898	1,427,740.00
March 3, 1899	700,000.00
June 6, 1900	1,000,000.00
March 3, 1901	975,000.00
June 28, 1902	733,220.00
Act of March 3, 1905	300,000.00
Sundry civil act June 30, 1906	200,000.00
Act of June 25, 1910	75,000.00
Total	7,521,746.46
Received from all other sources	55,801.71
Total	7,577,548.17

Total expenditures for fiscal year 1910.

Eastern section, Illinois River to feeder junction	$7,061.96
Western section, feeder junction to Rock River	933.72
Feeder line	2,419.66
Rock River pool	47,519.38
Total	57,934.72

Total expenditures to end of fiscal year 1910.

Eastern section	$3,169,779.61
Western section:	
Around rapids of Rock River	547,229.93
Rock River division	25,470.21
Rock River pool	91,418.67
Feeder junction to Rock River	1,941,508.53
Feeder line	1,683,628.55
Total	7,459,035.50

L L 4.

OPERATING AND CARE OF ILLINOIS AND MISSISSIPPI CANAL.

During the fiscal year the canal has been operated and maintained under the indefinite appropriation of funds provided by the law of July 5, 1884, the sum of $175,000 having been allotted for the fiscal year.

Work during the year has consisted of patrolling the banks, operating the locks, strengthening banks, repairing breaks, repairing and maintaining structures, revetting, repairing boats and building barges, completing telephone line, remedying seepage conditions, and miscellaneous items of maintenance and improvement to render the canal practicable and safe for service.

At the beginning of the year the main portion of the canal was out of operation on account of a serious break in the embankment of the feeder at the crossing of Green River. This break was repaired by driving rows of triple lap sheet piling along the face of the south abutment of Aqueduct 9 and under the embankment where the break occurred. Heavy cribs were built extending up and down stream from the abutment and the embankment rebuilt and heavily reenforced.

A considerable amount of water escaped from around the abutment when water was turned in. The water was shut off and 22 inches of concrete deposited in the bottom of the operating chamber of the emergency gate. It was found that this stopped most of the water, but a leak has persisted at that point ever since. Water was turned in on July 23, and the feeder has been operated ever since. It is proposed this season to do further reenforcing at this point.

The embankments on the feeder in the vicinity of Green River are the most critical on the whole canal by reason of their great height, of the want of the best material with which to build them, and of the fact that a break at that point would put the whole canal out of operation. As it was impossible to find houses in this vicinity that could be rented by patrolmen, it was decided to build two houses. Work on these houses has commenced, and they will be finished during the present season.

The work of deepening and cleaning out of seep ditches has been continued and very few complaints in regard to seepage have been made during the past year. Reenforcing of embankments, where needed, was continued, 54,025 cubic yards being placed on eastern section, 43,700 cubic yards on western section and 8,556 cubic yards on the feeder; 10,250 cubic yards of earth and 720 tons of stone were used in repairing crevasse at Aqueduct 9.

Riprapping of embankments has been continued. The following table shows the amount of stone loaded on barges and used in this work:

	Tons.
From Moline, Ill	15,490
From Sears, Ill	875
From Rock River, Ill	3,870
Total	20,235

The steamer *Marion* was overhauled and machinery repaired. The gasoline launch *Mary Mc.* was hauled out, engines thoroughly repaired and the upper part of hull and cabin rebuilt. Eight motor skiffs were thoroughly overhauled and repaired.

The winter was a severe one and ice froze in the canal to great thickness. No damage was done to any of the structures by ice in the canal or in the streams passing under it. Ice houses were built at Locks 5, 11, 23, 28, and on mile 20 of the feeder. All the ice houses were filled with ice and 230 tons buried in the peat on mile 23, main line. Permits to cut ice in the canal were sold at the rate of $1 per 1,000 square feet, and $255 was received from this source and turned into the Treasury.

The canal was closed to navigation from November 10, 1909, to April 1, 1910, by reason of ice. Attached hereto is a table giving the detail of lockages and statistics for the calendar year 1909. There is also attached a table showing the traffic in the canal by ton-miles for the calendar year 1909.

During the year two modern grain elevators were built on the feeder and handled considerable grain, although they were completed too late in the season to get much of the small grain. There is a good prospect that they will do a fair amount of business this year.

The usual work of patrolling the embankments, caring for structures, mowing weeds, etc., has been done. The operating force has assisted in the building of houses and barns, laid cement walks, riprapped banks, and done a great deal to render the works safer and to improve the appearance of the canal as a whole. The canal and structures pertaining to it are in condition and capable of handling a large amount of traffic.

Assistant Engineer James C. Long died May 26, 1910, after many years of faithful service on this work. Assistant Engineer A. O. Rowse was transferred from this work to the survey of the Des Moines River, Iowa. Assistant Engineer Fred W. Honens was transferred from this office to Kansas City, Mo. Otherwise the personnel of the force remains the same as last year.

COMMERCIAL STATISTICS.

Summary of commercial statistics, Illinois and Mississippi Canal, for the calendar year 1909.

	Lockages.	Passengers.	Cargo.	Gasoline boats.	Steamboats.	Barges.	Rowboats.	House boats.	Rafts.
	No.	*No.*	*Tons.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
March:									
United States vessels....	80	30	654	42	17	46	....	10	....
Other vessels............	245	491	21	88	....	1	290	30	....
Total..................	325	521	675	130	17	47	290	40	....
April:									
United States vessels....	666	227	19,530	177	211	556	....	54	4
Other vessels............	484	897	1,546	382	122	56	255	....	....
Total..................	1,150	1,124	21,076	559	333	612	255	54	4
May:									
United States vessels....	872	680	21,760	239	213	558	4	47	....
Other vessels............	407	698	859	231	125	22	78	30	....
Total..................	1,279	1,378	22,619	470	338	580	82	77	....
June:									
United States vessels....	910	428	33,466	288	212	569	....	26	....
Other vessels............	307	574	175	259	59	22	14	....	....
Total..................	1,217	1,102	33,641	547	271	591	14	26	....
July:									
United States vessels....	715	181	27,883	125	193	488	....	12	....
Other vessels............	177	393	67	187	9	11	54	21	....
Total..................	892	574	27,950	312	202	499	54	33	....
August:									
United States vessels....	889	833	25,191	342	68	631	....	122	....
Other vessels............	942	2,874	3,055	833	181	151	91	21	....
Total..................	1,831	3,707	28,246	1,175	249	782	91	143	....
September:									
United States vessels....	582	465	20,657	272	53	377	2	....	....
Other vessels............	1,011	3,364	1,381	969	62	47	241	87	....
Total..................	1,593	3,829	22,038	1,241	115	424	243	87	....
October:									
United States vessels....	644	715	22,493	226	93	465	23	66	....
Other vessels............	759	1,490	10,652	513	178	157	135	....	....
Total..................	1,403	2,205	33,145	739	271	622	158	66	....
November:									
United States vessels....	395	228	7,909	85	42	295	21	47	....
Other vessels............	425	725	10,426	272	114	120	44	55	....
Total..................	820	953	18,335	357	156	415	65	102	....
December:									
United States vessels....	15	....	600	....	....	17	....	....	....
Other vessels............	28	75	241	25	2	2	44	....	....
Total..................	43	75	841	25	2	19	44	....	....
United States vessels....	5,768	3,787	180,143	1,796	1,102	4,002	50	384	4
Other vessels............	4,785	11,581	28,423	3,759	852	589	1,246	244	....
Grand total, 1909......	10,553	15,368	208,566	5,555	1,954	4,591	1,296	628	4

Report of traffic in the canal by ton-miles for the calendar year 1909.

Month.	United States vessels.	Other vessels.	Total.
March	6,876.3	343.2	7,219.5
April	83,342.8	4,997.1	88,339.9
May	48,637.1	3,368.4	52,005.5
June	129,437.3	1,415.3	130,852.6
July	62,794.0	4,900.0	67,694.0
August	829,234.0	1,000.0	830,234.0
September	75,199.0	4,446.0	79,645.0
October	104,762.0	28,067.0	132,829.0
November	32,515.0	15,506.0	48,021.0
December	4,250.0	....	4,250.0
Total	1,377,047.5	64,043.0	1,441,090.5

Lands leased along the Illinois and Mississippi Canal during fiscal year ending June 30, 1910.

Name.	Acres.	Date of leases.	Consideration per annum.	Length of lease.
		1908.		*Years.*
Stewart & Peterson	0.2	Mar. 1	$5.00	5
Bernard E. Sommers	.1	...do....	5.00	5
Chas. Konitzer	.46	...do....	5.00	5
Charlotte A. Scott	2.00	Apr. 1	5.00	5
James Knight	.02	May 1	5.00	5
Geo. W. Mikesell	1.4	July 1	10.00	5
		1909.		
Smith-Hippen Co	1.5	May 1	10.00	5
Do	1.5	...do....	10.00	5
Douglas Moseley	.02	...do....	5.00	5
Martin & Bowen	.09	July 1	5.00	5
		1910.		
Fredolph R. Olson	([a])	Mar. 15	15.00	1
F. L. Capps	([a])	June 1	5.00	5

[a] Right of way.

Summarized statement of expenditures from appropriation for "Operating and care of canals and other works of navigation, indefinite," applied to Illinois and Mississippi Canal.

Services:	
Assistant engineers	$7,265.81
Junior engineers	4,200.00
Chicago office	3,425.00
Overseers	11,940.33
Lockmen	15,422.83
Patrolmen	29,026.50
Teamsters with teams	28,997.18
Laborers	21,755.57
Enginemen	2,897.17
Foremen	1,106.38
Carpenters, painters, masons, watchmen, etc	10,790.93
Operation and maintenance of boats	17,793.22
Telephone line	445.65
Miscellaneous materials and supplies	14,022.22
Printing, stationery, blue printing, etc	992.84
Livery	824.46
Travel expense	1,010.29
Freight paid by department settlement	839.42
Total	172,755.80

[Exclusive of $2,859.81 outstanding liabilities June 30, 1910.]

Summarized statement of money received from various sources in connection with Illinois and Mississippi Canal and deposited with the United States Treasurer to credit of "miscellaneous receipts."

July 3, 1909, Geo. W. Mikesell, lease of land	$10.00
October 1, 1909, Martin & Bowen, lease of land	5.00
March 9, 1910, Fredolph Olson, lease of land	15.00
March 9, 1910, Charles Konitzer, lease of land	5.00
March 9, 1910, Stewart & Peterson, lease of land	5.00
March 17, 1910, Bernard E. Sommers, lease of land	5.00
April 6, 1910, Charlotte A. Scott, lease of land	5.00
April 16, 1910, James Knight, lease of land	5.00
April 16, 1910, Smith-Hippen Company, lease of land	10.00
Do	10.00
April 16, 1910, Douglas Moseley, lease of land	5.00
February 15, 1910, permits to cut ice	251.34
March 12, 1910, permits to cut ice	2.47
July 20, 1909, sale of charts	1.60
November 26, 1909, sale of charts	2.00
June 1, 1910, sale of charts	1.20
Total	338.61

APPENDIX M M.

IMPROVEMENT OF RIVERS AND HARBORS IN THE GRAND RAPIDS, MICHIGAN, DISTRICT.

REPORT OF MAJ. C. S. RICHÉ, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. St. Joseph Harbor and River, Michigan.
2. Harbor at South Haven, Michigan.
3. Harbor at Saugatuck and Kalamazoo River, Michigan.
4. Harbor at Holland, Michigan.
5. Harbor at Grand Haven, Michigan.
6. Grand River, Michigan.
7. Muskegon Harbor, Michigan.
8. Harbors at White Lake and Pentwater, Michigan.
9. Harbor at Ludington, Michigan.
10. Harbor at Manistee, Michigan.
11. Harbor of Refuge at Portage Lake, Michigan.
12. Arcadia Harbor, Michigan.
13. Frankfort Harbor, Michigan.
14. Harbor at Charlevoix, Michigan.
15. Harbor at Petoskey, Michigan.
16. U. S. dredge *General G. G. Meade.*

United States Engineer Office,
Grand Rapids, Mich., July 16, 1910.

Sir: I have the honor to transmit herewith the annual report for the works of the Grand Rapids, Mich., district. These works were in charge of Maj. Charles Keller, Corps of Engineers, until March 14, 1910, and have since that time been under my charge.

Very respectfully, your obedient servant,

C. S. Riché,
Major, Corps of Engineers.

The Chief of Engineers, U. S. Army.

M M I.

IMPROVEMENT OF ST. JOSEPH HARBOR AND RIVER, MICHIGAN.

(A) ST. JOSEPH HARBOR.

Under special agreement the Green Stone and Quarrying Company placed 500.2 cords of stone in the lake side and channel side pockets of the north pier between stations 2+50 W. and 13+50 W. and 309 cords of stone in the lake side and channel side pockets of the south pier between stations 13+23.5 and 26+22, completing the refilling of these portions of the piers. The work was done August 11 to October 2, 1909, at a cost of $7,735.23. The decking of the north pier between stations 1+01 W. and 13+50 W. and the walk and decking of the south pier between stations 0+00 and 26+22, and a broken cross-tie at station 2+41.5, south pier, were repaired by day labor in August–October, 1909, at a cost of $234.59.

Soundings made March 22–28, 1910, showed the following available depths: Outside, 24.6 feet on the line of the north pier, 19.2 feet in front of the entrance and 21.3 feet on the line of the south pier; between the piers, 18.8 feet; from inner ends of piers to shoal at mouth of Paw Paw River, 17 to 18 feet; on shoal at mouth of Paw Paw River, 14.2 feet, and thence to east end of Benton Harbor Canal, 17 feet.

Dredging by the *Meade* for maintenance was begun April 10 and completed April 21, 1910. The quantity dredged was 14,364 cubic yards, with resulting available depths of 20 feet on the outer bar, 19.1 feet between the piers, and 17 feet through the shoal at the mouth of the Paw Paw River. The cost of the work was $1,757.88.

All of the above work comes under the head of maintenance.

Damage to superstructure of south pier station 1+45.5 and 2+49.5 in September, 1909, by vessel belonging to the Green Stone and Quarrying Company was repaired in October, 1909, and paid for by the owners of the vessel. The outer end of south pier, damaged August 31, 1909, by vessel belonging to the Graham & Morton Line, was repaired in September and October, at a cost of $39.83, which was refunded by the owners of the vessel.

In accordance with authority of the Secretary of War dated December 4, 1909, the *Meade* dredged 30,766 cubic yards for and at the expense of the United States Light-House Establishment from the basin in front of the supply depot, increasing the depth from 8.3 feet to 16 feet. The work was done March 25 to April 9 and April 22–25, at a cost of $2,516.76.

(B) ST. JOSEPH RIVER.

No use has been made of the river during the past fiscal year to require any maintenance of the channel.

APPROPRIATIONS.

ST. JOSEPH HARBOR AND RIVER, MICHIGAN.

To March 2, 1899 (as per H. Doc. No. 421, 57th Cong., 2d sess.)		[a] $487,113.00
Allotted from harbors on Northwestern Lakes, 1867	$7,500.00	
Transferred in 1870 to Grand Haven Harbor	500.00	
		[b] 7,000.00
		494,113.00
March 3, 1899		50,000.00
June 6, 1900		253,950.00
March 3, 1901		38,000.00
June 13, 1902		23,250.00
March 3, 1905		15,000.00
March 2, 1907		15,000.00
March 3, 1909 (allotment Apr. 23, 1909)		15,000.00
Miscellaneous receipts		1,133.33
Total		905,446.33
Amount carried to surplus fund, 1856		.80
Balance		905,445.53

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[a] Includes allotment July 13, 1892, for St. Joseph River, $1,000.

[b] Not included in H. Doc. 421; this amount has been received and expended.

ST. JOSEPH RIVER, MICHIGAN.

August 11, 1888	$2,500.00
September 19, 1890	1,000.00
August 18, 1894	500.00
June 3, 1896	500.00
June 13, 1902	$750.00
March 2, 1907	1,000.00
Total	[a] 6,250.00

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE (EMERGENCY CONTRACT).

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.10 per ton; West Virginia Winefrede, $3 per ton; Hocking Valley, $2.90 per ton; Saginaw, $2.75 per ton; Pittsburg No. 8, $2.65 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.23 per ton; West Virginia Thacker Lump, $3.20 per ton; Hocking Valley, $2.85 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $2.80 per ton.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened March 1; closed December 25.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered:			
Steamers	1,296	927,248	266,215
Sailing	34	3,968	....
Other craft [b]	15	149	....
Total	1,345	931,365	266,215

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[a] Allotment July 13, 1892, $1,000, included in [a], page 2178.

[b] This may include tugs, tow barges, and small craft, but an accurate record was not obtainable.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Bunker coal	12,500 net tons	12,500	$36,250
Cedar posts	23,000 pieces	403	2,300
Flour	4,100 barrels	402	20,500
Fruit	29,010 net tons	29,010	1,740,600
Lath	800,000	240	2,800
Lumber	2,725,000 feet	5,450	40,875
Miscellaneous	72,947 net tons	72,947	13,130,460
Potatoes	6,000 bushels	180	2,400
Sand	16,400 cubic yards	24,600	4,100
Salt	52,300 barrels	7,845	36,610
Shingles, cedar	2,132,000	213	5,330
Ties	1,000 pieces	35	500
Vinegar	4,000 casks	1,000	22,000
Total		[a] 154,825	15,044,725

[a] Does not include 7,188 tons of stone received and used in connection with the harbor improvement carried on by the United States.

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	145,913
1909	154,825
Increase	8,912

COMMERCIAL STATISTICS, ST. JOSEPH RIVER, MICHIGAN, CALENDAR YEAR, 1909.

[Data furnished by Drake & Wallace, of St. Joseph, Mich.]

The gasoline launch *Wolverine* carried 7,200 passengers, but no freight other than campers' outfits and supplies.

MM 2.

IMPROVEMENT OF SOUTH HAVEN HARBOR, MICHIGAN.

Under contract dated March 29, 1909, for refilling parts of the two piers, Thomas H. Smith placed 119.82 cords of 1,000-pound stone covering on the stone filling in projection on north side of north pier, station 13+10 to 15+98; 72.93 cords of 500-pound, and 109.88 cords of 100-pound stone filling in north pier, station 4+68 to 9+89, and south pier station 8+56 to 10+50, refilling vacancies in same. The work was done July 21 to August 26, 1909, at a cost of $4,582.98.

Dredging by the *Meade* was begun July 1 and completed July 23, 1909. The quantity dredged was 35,168 cubic yards, with resulting depths of 16.1 feet between the piers and 18.9 feet on the outer bar. The cost of the work was $3,770.21.

Soundings made March 31–April 1, 1910, showed the following available depths: Outside, 16.4 feet on line of the north pier, 14.6 feet in front of the entrance, and 13.6 feet on the line of the south pier; between the piers, 20 feet at the outer end, 15.5 feet about 300 feet inside, and 15 feet at inner end; in the river, 14.5 feet, and the required depths were again restored by the *Meade* April 27 to May 21, 1910. The quantity dredged at this time was 43,577 cubic yards, with resulting depths of 20 feet on outer bar, 17.2 feet between piers at entrance, decreasing to 16.2 feet farther inside and 15 feet in inner harbor (river). Clay and stones, which the dredge could not move, were found from station 10 W. to 16 W. The expenditures for this work was $3,698.61.

All the above work is for maintenance.

Operations under the project of March 3, 1905, have heretofore been prevented by the provision in that project that no expenditures shall be made under it until proper dock lines have been established and suitable bulkheads built along those lines by the city of South Haven or by the riparian owners and the property lying on the channel side of these dock lines shall have been deeded to the United States free of cost.

A survey to establish dock lines for the proposed widening of the inner harbor was made in November and December, 1909, and a report of same submitted under date of January 25, 1910. The recommended dock lines were approved by the Secretary of War February 18, 1910. As proper dock lines have now been established, and as it is known that the city of South Haven has entered upon the construction of suitable bulkheads, and is nearly ready to perfect the conveyance of the property in question to the United States, it is evident that the time has come to arrange for the beginning of operations under the project of 1905.

The sum of $461.31 was expended on above survey.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$116,000
For maintenance of improvement	3,000
	[a] $119,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$312,300.00
June 13, 1902 (allotment May 14, 1904)	5,000.00
March 3, 1905	50,000.00
March 2, 1907	40,000.00
June 25, 1910	50,000.00
Miscellaneous receipts	2,137.47
Total	459,437.47

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE (EMERGENCY CONTRACT).

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.10 per ton; West Virginia Winefrede, $3 per ton; Hocking Valley, $2.90 per ton; Saginaw, $2.75 per ton; Pittsburg No. 8, $2.65 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.23 per ton; West Virginia Thacker lump, $3.20 per ton; Hocking Valley, $2.85 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $2.80 per ton.

STONE.

Contractor: Thomas H. Smith.
Date of contract: March 29, 1909.
Date of approval: April 7, 1909.
Date of beginning: Opening of navigation, 1909.
Date of expiration: July 31, 1909.
Work: Furnishing, delivering, and placing about 111 cords of 100-pound stone for filling, at $10.45 per cord; 63 cords of 500-pound stone for filling, at $13 per cord; and 90 cords of 1,000-pound stone for filling, at $18 per cord.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened March 6; closed December 31.

Vessel classification.

Class.	Arrivals and departures. American.	Arrivals and departures. Net registered tonnage.	Passengers carried.
Registered:			
Steamers	484	379,703	145,225
Sailing	2	136	....
Other craft [a]	11	4,134	....
Total	497	383,973	145,225

[a] This may include tugs, tow barges, and small craft, but an accurate record was not obtainable.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
Bunker coal	2,708 net tons	2,708	$8,124	Not known	Not known.
Crushed stone	700 cubic yards	875	770	do	Do.
Fruit	5,400 net tons	5,400	324,000	do	Do.
Lumber, hemlock	77,000 feet	135	924	do	Do.
Machinery	3,180 pounds	2	1,300	do	Do.
Miscellaneous	4,818 net tons	4,818	787,650	do	Do.
Pianos and piano cases	579 net tons	579	166,800	do	Do.
Shingles, cedar	154,000	15	400	do	Do.
Wood carvings and moldings	464,340 pounds	231	34,812	do	Do.
Total		[a] 14,763	1,324,780		

[a] Does not include 1,665 tons of stone received and used in connection with the harbor improvement carried on by the United States.

Total freight carried:	Tons.
1908	18,765
1909	14,763
Decrease	4,002

The Dunkley-Williams Company, operating vessels between Chicago and South Haven, was succeeded by the Chicago and South Haven Steamship Company.

M M 3.

IMPROVEMENT OF HARBOR AT SAUGATUCK AND KALAMAZOO RIVER, MICHIGAN.

Dredging begun June 29, 1909, under contract with John Smith, was completed August 20. A channel was dredged 90 feet wide between the piers, 18 feet deep in the outer part and 16 feet deep in the inner part; a channel was dredged 60 feet wide and 14 feet deep in the river, station 45+50 to 56+50; and a small shoal was removed from the river near station 100, at the town of Saugatuck. The total quantity dredged, including the 1,523 cubic yards dredged in June but not paid for, was 29,637 cubic yards, at a cost of $5,099.09.

Soundings made April 5–12, 1910, showed the following depths: Outside, on line of north pier 13 feet, in front of entrance 15.6 feet, and on line of south pier 15.8 feet; between piers, at outer end 15 feet in center of channel and 17 feet close to the south pier and 13.4 feet farther inside; in the river, 13.5 feet to the town of Saugatuck. Soundings of May 25–26 showed a depth of only 12.5 feet in front of the entrance, this additional shoaling having been caused by storms since April 12.

Dredging by *Meade* was begun May 24 and completed June 11, 1910, removing 42,762 cubic yards. The resulting depths were 18 feet on the outer bar and 16 feet between the piers, the width of the 16-foot channel being narrow in places. The amount expended during the fiscal year on this work was $1,587.29.

By day labor repairs were made in September–November, 1909, to tie rods and screw bolts in the pile piers, at a cost of $192.23.

The inner end of the north revetment having suffered severe damage by undermining, it was temporarily strengthened by driving front piles, station 25+50 to 27+37, and rear anchor piles, station 26+88 to 27+20, and securing them to the existing work by means of screw bolts and tie rods. The work was done December 1–23, 1909, under agreement with William Van Anrooy, at a cost of $1,471.99.

All the above work is charged to maintenance.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$26,000
For maintenance of improvement	4,000
	[a]30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Date.	Saugatuck Harbor.	Kalamazoo River.	Total.
To June 2, 1896 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$157,439		$157,439
June 3, 1896	10,000	$5,000	15,000
March 3, 1899	7,000	10,000	17,000
June 6, 1900 (allotments July 2, 1900, $2,500; Mar. 21, 1901, $5,000)	7,500		7,500
June 13, 1902	15,000		15,000
June 13, 1902 (allotment May 31, 1904)	5,300		5,300
March 3, 1903		100,000	100,000
March 3, 1905	15,000	60,000	75,000
June 13, 1902 (allotment Dec. 8, 1906)			4,700
March 3, 1905 (allotment Oct. 22, 1906)			10,000
March 2, 1907			75,000
March 3, 1909 (allotment Apr. 9, 1909)			10,000
June 25, 1910			20,000
Total	217,239	175,000	[a] 511,939

[a] Exclusive of 5 cents refundment of overpayment.

CONTRACT IN FORCE (EMERGENCY).

DREDGING.

Contractor: John Smith.
Date of contract: June 19, 1909.
Date of beginning: June 29, 1909.
Date of expiration: August 10, 1909.
Rate: 16½ cents per cubic yard, measured on scows or in bins.
Work: Dredging for maintenance of new channel.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened March 20; closed December 24.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered:			
Steamers	738	114,672	14,608
Schooner-barge	12	4,626	
Total	750	119,298	14,608

Freight traffic.

Articles.	Amount, in customary unit.	Amount, in short tons.	Valuation.
Coal, hard	685 net tons	685	$4,452
Coal, soft	100 net tons	100	300
Cooperage stock	11,000 barrels	82	2,200
Empty baskets	1,450,000 pieces	363	33,350
Fruit	5,866 net tons	5,866	351,960
Lumber	940,000 feet	1,410	18,800
Miscellaneous	161 net tons	161	28,175
Total		8,667	439,237

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	4,885
1909	8,667
Increase	3,782

A new boat line was established in 1909 under the name of the Crawford Transportation Company, operating between Chicago, Saugatuck, and Douglas.

M M 4.

IMPROVEMENT OF HARBOR AT HOLLAND, MICHIGAN.

Under continuing contract for the construction of the piers for the outer expansion basin Macdonald & Beauvais placed 117.5 cords of stone filling in the north side pile structure and cut off and upset the ends of tie rods and screw bolts in both pile structures, completing the contract July 10. The expenditures during the fiscal year on account of this contract were $17,125.87.

The repairs to south pier under contract with the Columbian Construction Company, begun in the previous fiscal year, were continued and completed August 27, 1909. The work consisted in completing the six courses of new superstructure, station 2+02 to 5+43.5, placing 215.3 cords of new stone filling and completing the deck. The expenditures on account of this contract were $9,749.75.

All the work described above, having formed part of the estimate upon which the existing project is based, must be classified as new work.

The following operations are under the head of maintenance:

Under contract with Leathem & Smith Towing and Wrecking Company, dated February 4, 1908, 180.6 cords of stone filling were placed in the north pier station 0+60 to 2+50 and 5+04 to 7+28 and in the south pier station 5+50 to 6+00. The work was done July 17–20, at an expenditure of $1,520.79.

Slight repairs were made by day labor to the old deck of north pier, station 2+10 to 2+63 at an expenditure of $8.30.

Under emergency contract with Johnston & Rasch, dated September 10, 1909, for increasing the security of the converging piers by placing riprap weighing from 3 to 10 tons each along the lake faces and the outer ends of the two converging piers, 3,568 tons were placed along the entire lake face and outer end of the north converging pier and along the lake face station 0 to 6+58 and the outer end of the south converging pier. The work was done September 26, 1909, to January 4, 1910, and March 17–23, 1910. The expenditures for this work were $12,495.36.

The channel between the piers and in the entrance basin was dredged by the *Meade* July 24–28, 1909, and March 23–24, 1910, the total quantity dredged being 17,538 cubic yards and the cost $3,302.38.

Soundings made April 14–16, 1910, showed the following available depths: Outside of entrance to converging piers 22 to 24 feet; between converging piers 21.9 feet at outer end and 18.9 feet farther in, in center of channel; between interior piers 18.4 feet with 18 feet at inner end.

The outer end of the south converging pier has been found to have received serious injury from some unknown cause, the end wall having been entirely or partially destroyed from the water surface down to a depth of about 10 feet and a special agreement has been entered into with William VanAnrooy for the required repairs. The same agreement provides for repairing damage to the north wall of the north converging pier caused by the steamer *Puritan* April 15, 1910, the cost to be collected from the owners of the vessel.

The sum of $73.24 was expended on examination of damage to south breakwater.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$16,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$419,315.31
March 3, 1905	65,000.00
March 3, 1905 (allotment Jan. 6, 1906)	10,000.00
June 30, 1906	70,000.00
March 2, 1907	138,452.00
March 4, 1907	40,000.00
June 25, 1910	12,000.00
Miscellaneous receipts	1,100.00
Total	755,867.31
Amount carried to surplus fund	1.19
Balance	755,866.12

CONTRACTS IN FORCE.

EXTENSION OF PIERS (CONTINUING CONTRACT).

Contractors: Macdonald & Beauvais.
Date of contract: October 11, 1905.
Date of approval: October 21, 1905.
Date of beginning: April 15, 1906.
Date of expiration: December 31, 1908 (time limit waived).

Rates: Dredging for crib foundations, 25 cents per cubic yard; foundation piles, 50 cents per linear foot; oak guard piles, 40 cents per linear foot; piles for pile structures, 50 cents per linear foot; oak timber, $50 per thousand; white, Norway, or southern pine, or Oregon fir timber, $32.50 per thousand; hemlock timber, $23.50 per thousand; white, Norway, or southern pine, or Oregon fir planks, $31 per thousand; driftbolts, screw bolts, tie-rods, and spikes, 3 cents per pound; stone, $6 per cord.

Supplemental contract dated March 5, 1907, provided that 6 of the cribs to be placed in the south pier shall be made 30 feet wide instead of 24 feet, and that both sides and ends of both pier extensions for their full length shall be riprapped.

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[a] Exclusive of the balance unexpended July 1, 1910.

Rates for extra material: Foundation piles, 50 cents per linear foot; hemlock timber, $35 per thousand; pine or Oregon fir timber, $50 per thousand; pine or Oregon fir planks for decking, $42 per thousand; driftbolts and spikes, 5 cents per pound; stone for foundation and filling, $8.50 per cord; stone for riprap, $11 per cord; extra cost of replacing 28-foot, 26-foot, and 24-foot by 34-foot, 32-foot, and 30-foot hemlock cross-ties, $6.50 per thousand; extra cost of replacing 24-foot by 30-foot pine or Oregon fir cross-ties, $12.50 per thousand.

STONE.

Contractor: Leathem & Smith Towing and Wrecking Company.
Date of contract: February 4, 1908.
Date of approval: February 26, 1908.
Date of beginning: Opening of navigation, 1908.
Date of expiration: September 30, 1908 (time limit waived).
Work: Furnishing, delivering, and placing about 172 cords of 100-pound stone for filling, at $7.97 per cord.

EMERGENCY.

Contractor: Johnson & Rasch.
Date of contract: September 10, 1909.
Date of beginning: September 20, 1909.
Date of expiration: December 31, 1909.
Work: Furnishing, delivering, and placing riprap stone from 3 to 10 tons in weight, at $3.25 per ton.

REPAIR OF SOUTH PIER.

Contractor: Columbian Construction Company.
Date of contract: June 15, 1908.
Date of approval: July 15, 1908.
Date of beginning: July 31, 1908.
Date of expiration: December 31, 1908 (time limit waived).
Rates: Cutting down and removing old work, $1.50 per linear foot; oak piles, 30 cents per linear foot; oak timber, $60 per thousand; pine or Douglas fir timber, $39 per thousand; pine or Douglas fir plank for decking, $39 per thousand; driftbolts, screw bolts, tie-rods, and spikes, 4 cents per pound; stone, $8.25 per cord of 128 cubic feet.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.25 per ton; West Virginia Winefrede, $3.15 per ton; Hocking Valley, $3 per ton; Saginaw, $2.90 per ton; Pittsburg No. 8, $2.80 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.33 per ton; West Virginia Thacker lump, $3.30 per ton; Hocking Valley, $2.95 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $2.85 per ton. Less 10 cents per ton on all coal after June 15, 1910.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened March 1; closed December 30.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered, steamers	774	743,443	66,000

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Bunker coal	5,593 net tons	5,593	$16,779
Coal, hard	1,250 net tons	1,250	7,500
Fruit	1,432 net tons	1,432	85,920
Furniture	400,000 pounds	200	26,000
Harness and case leather	1,336,131 pounds	668	490,122
Hides	30,000 pounds	15	4,800
Leather	4,295 pounds	2	1,288
Lumber	680,000 feet	1,020	17,000
Machinery and tools	12,126 pounds	6	606
Miscellaneous	59,488 net tons	59,488	10,707,840
Oils and grease	59,504 pounds	30	4,165
Posts	3,000 pieces	53	300
Roofing	31,090 pounds	15	622
Salt	450 barrels	68	315
Sash and doors	11,170 pounds	6	559
Shingles	300,000	30	750
Sole leather	220,997 pounds	111	58,882
Tanner's extracts	29,435 pounds	15	1,472
Tanner's acids	12,453 pounds	6	498
Veneers and built-up woods	450,000 pounds	225	20,000
Total		[a] 70,233	11,445,418

[a] Does not include 9,000 tons of stone used in connection with the harbor improvement carried on by the United States.

Average haul or distance freight was carried and rate per ton-mile, not known.

Total freight carried:	Tons.
1908	165,155
1909	70,233
Decrease	[a] 94,922

M M 5.

IMPROVEMENT OF GRAND HAVEN HARBOR, MICHIGAN.

Work under the contract with the Green Stone and Quarrying Company, dated July 1, 1908, for refilling and riprapping parts of the piers, begun in November, 1908, was completed July 14, 1909, by placing 23 cords of 500-pound riprap along the channel face of the south revetment from station 38+40 to 38+90; 65 cords of 100-pound and 35 cords of 500-pound stone filling in the north pier from station 7+94 E. to 12+00 E. and in the southwest corner pocket at outer end of pier; and 72 cords of 100-pound and 3 cords of 500-pound stone filling in the south pier from station 6+06 W. to 9+09 W. and in the southwest corner pocket at outer end of pier. The expenditures on account of this contract were $13,102.37.

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[a] This does not prove that a decrease in the tonnage actually occurred. The statement furnished for the commercial statistics for 1909, by the same authority as those upon whose statement the statistics for 1908 were exclusively based, has been critically examined and found to be so excessively erroneous that most of it had to be discarded. It is suspected that the statistics for 1908 were equally unreliable.

The outer bar and the channel between the piers from station 0+00 to 13+00 E. was dredged by the *Meade* November 26–30 and December 22, 1909, to January 4, 1910, removing a total of 32,637 cubic yards and giving a resulting depth, in January, of 21.5 feet on the outer bar and 20 feet between the piers. The cost of the work was $3,313.23.

Soundings made June 13–17, 1910, showed the following available depths: Outside the piers, 19.4 feet on line of north pier, 19.6 feet to 20.3 feet in front of entrance, and 22 feet on line of south pier. Between piers at outer end, 20 feet in north half and 19 feet in south half of channel, thence 20 feet to the Grand Trunk car ferry slip.

A small house was built over the water gauge in south pier at station 4+00 E.; the work was done in October, 1909, at a cost of $76.35.

The government dredge *Farquhar* and derrick *Saginaw* were employed May 10–16, 1910, to remove from the government basin the old sunken scow at the west end and the anchor chain across the basin, which were obstructions on the site of the proposed new revetment. The cost of the work was $249.11.

A contract was entered into May 11, 1910, with J. E. Hathaway & Co., for the repair of the south revetment, I station 7+09 to 11+68, II station 18+35 to 30+03, and III station 30+03 to 43+61. No work had been done up to the end of June except the assembling of plant and materials for construction. The sum of $89.18 was expended on account of this contract for engineering contingencies.

The sum of $3,401.94 was expended during the fiscal year on account of contract for repair of south pier completed June 25, 1909.

All the above work comes under the head of maintenance.

From January 4 to March 21, 1910, the *Meade* was in winter quarters at this harbor.

The United States property at the harbor has been in charge of a watchman throughout the year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$34,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To July 12, 1892 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$623,866.15
1870 (allotment)	[b]500.00
July 13, 1892	90,000.00
August 18, 1894	25,000.00
June 3, 1896	20,000.00
March 3, 1899	10,000.00
June 13, 1902	10,000.00
June 13, 1902 (allotment April 27, 1904)	10,000.00

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Not included in House Document No. 421; this amount has been received and expended.

April 28, 1904 (allotments):		
May 31, 1904	$20,000.00	
July 9, 1904	20,000.00	
January 17, 1905	10,000.00	
		$50,000.00
March 3, 1905		30,000.00
March 2, 1907		50,000.00
March 3, 1909 (allotment April 23, 1909)		100,000.00
June 25, 1910		10,000.00
Miscellaneous receipts		5,576.92
Total		1,034,943.07

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.10 per ton; West Virginia Winefrede, $3 per ton; Hocking Valley, $2.90 per ton; Saginaw, $2.75 per ton; Pittsburg No. 8, $2.65 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.23 per ton; West Virginia Thacker lump, $3.20 per ton; Hocking Valley, $2.85 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $2.80 per ton.

STONE.

(Emergency contract.)

Contractor: The Green Stone and Quarrying Company.
Date of contract: July 1, 1908.
Date of expiration: December 1, 1908. (Time limit waived.)
Work: Furnishing, delivering, and placing 325 cords of 100-pound stone, at $11 per cord, and 725 cords of 500-pound stone, at $12 per cord, for refilling parts of piers.

REPAIR OF SOUTH PIER.

Contractor: Burk, Smith & Nelson.
Date of contract: July 27, 1908.
Date of approval: August 14, 1908.
Date of beginning: August 31, 1908.
Date of expiration: December 31, 1908. (Time limit waived.)
Rates: Cutting down and removing old work, $1.95 per linear foot; oak piles, 35 cents per linear foot; oak timber, $65 per thousand; pine or Douglas fir timber, $37 per thousand; hemlock timber, $30 per thousand; pine or Douglas fir plank for decking, $35 per thousand; hemlock plank for decking, $28 per thousand; driftbolts, screw bolts, tie-rods, and spikes, 4 cents per pound; pile shoes, 6 cents per pound; stone, $7 per cord.

REPAIR OF SOUTH REVETMENT.

Contractor: J. E. Hathaway & Co.
Date of contract: May 11, 1910.
Date of approval: June 9, 1910.
Date of beginning: June 29, 1910.
Date of expiration: December 1, 1910.

Rates: Cutting down and removing old work, $1.50 per linear foot; oak piles, 34 cents per linear foot; oak timber, $70 per thousand feet b. m.; pine or Douglas fir timber, $42 per thousand feet b. m.; pine or Douglas fir planks, for sheet piles, $45 per thousand feet b. m.; pine or Douglas fir plank for walk, $40 per thousand feet b. m.; driftbolts and tie-rods, 3 cents per pound; spikes, 4 cents per pound; screw bolts, angle irons, carriage bolts, and pile shoes, 5 cents per pound.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Open the entire year.

Vessel classification.

Class.	Arrivals and departures.	
	American.	Net registered tonnage.
Registered, sailing and other craft [a]	2,932	3,655,027

[a] This may include tugs, tow barges, and small craft, but an accurate record was not obtainable.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Apples	1,661 net tons	1,661	$55,361
Asbestos fiber	1,141 net tons	1,141	34,230
Barley	344,066 bushels	8,257	206,440
Bran and feed	20,105 net tons	20,105	402,100
Bunker coal	26,876 net tons	26,876	80,628
China clay	4,761 net tons	4,761	71,415
Coal, hard	10,925 net tons	10,925	65,550
Coal, soft	22,031 net tons	22,031	61,687
Copper	20,890 net tons	20,890	5,849,200
Corn	329,870 bushels	9,236	197,922
Flour	76,456 net tons	76,456	3,822,800
Iron, pig	121 net tons	121	1,936
Iron ore	53,720 net tons	53,720	174,590
Lumber	16,496,000 feet	24,744	247,440
Malt	26,906 net tons	26,906	1,614,360
Meat	6,977 net tons	6,977	1,395,400
Miscellaneous	218,571 net tons	218,571	39,342,780
Middlings	2,213 net tons	2,213	44,260
Millstuff	1,664 net tons	1,664	24,960
Oats	403,294 bushels	6,452	161,318
Rye	53,978 bushels	1,511	26,989
Salt	6,549 net tons	6,549	27,833
Sugar	3,102 net tons	3,102	139,590
Sugar refuse	283 net tons	283	4,245
Wheat	124,444 bushels	3,733	111,999
Wood pulp	815 net tons	815	24,450
Total		[a] 559,700	54,189,483

[a] Does not include 7,604 tons of stone used in connection with the harbor improvement carried on by the United States.

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	437,625
1909	559,700
Increase	122,075

MM 6.

IMPROVEMENT OF GRAND RIVER, MICHIGAN.

At the end of June, 1909, the government dipper dredge *Farquhar* and derrick conveyor *Saginaw* were at work on Plaster Creek bar, station 51+20. Work continued on the portion of the river above the Lake Shore and Michigan Southern Railway bridge to the end of the season. The following dredging was done:

Cut No. 3 was dredged station 51+20 to 54+50, 60+40 to 63+20, and 76+90 to 120+00; cut No. 2, station 110+00 to 116+00; cut No. 1, station 110+00 to 139+60; and cut No. 4, station 33+00 to 110+00. The cuts were usually about 30 feet wide, except cut No. 4, which was of the requisite width to complete the channel 100 feet wide at depth of 6 feet below low water of 1889. This completes the channel 100 feet wide station 33+00 to 110+00 and 128+00 to 143+00. This is construction work except cut 3, station 60+00 to 63+20 (1,187 cu. yds.), which is charged to maintenance. Work closed for the season November 22 and the plant was laid up in the government basin at Grand Haven. General repairs were made during the winter and spring.

By soundings made May 5-11, 1910, on five short bars at miles 23.7, 24.6, 25.5, 26.6, and 30, it was found that a small amount of dredging was needed on each bar except the second.

The plant was fitted out and left Grand Haven May 17, 1910, and work for the season was begun May 18, at mile 30, and at the end of June dredging was in progress on bar at mile 26.6. Three cuts with an average length of about 720 feet were made across the bar at mile 30, removing 8,916 cubic yards of sand and 16 snags; two cuts, with average length of about 1,040 feet, were completed, and a third cut dredged for a length of 160 feet on bar at mile 26.6, removing 11,251 cubic yards of sand and 9 snags.

The total work for the fiscal year comprised 20,238 linear feet of single-dredge cut about 30 feet wide, except in case of cut 4, as noted above, and the removal of 80,331 cubic yards, place measurement, of material and 40 snags. The material dredged was as follows:

	Cubic yards.
Sand	20,588
Clay	7,641
Gravel	43,568
Bowlders	6,972
Shale and hard pan	1,562
Total	80,331

Cost of dredging.

Pay roll	$5,785.54
Fuel	1,151.52
Supplies	521.65
Repairs	1,302.51
Repairs to scows and small plant	164.51
Tugs: service, repairs, etc	326.83
Total	9,252.56
Cubic yards dredged	80,331
Cost per cubic yard, cents	11.52
Hours worked	1,104
Hours delayed	204

The channel from Grand Rapids to Grand Haven, 100 feet wide and 6 feet deep below low water of 1889, has been completed for some time, except the following portions which have been partly dredged, with resulting depth of 6 feet for widths of 40 to 90 feet:

	Feet.
Station —25 to —23+50	150
Station —19+50 to +33	5,250
Station 110 to 128	1,800
Station 192 to 204	1,200
Station 460 to 466	600
Total	9,000

The completed channel has filled in in many places and will continue to fill in with every high water which carries the loose sand deposited back of the temporary training walls back into the dredged channel.

The amounts expended during the fiscal year were as follows:

	Construction.	Maintenance.	Total.
Dredging	$6,793.00	$2,459.56	$9,252.56
Superintendence, surveys, and contingencies	823.98	908.74	1,732.72
Total	7,616.98	3,368.30	10,985.28

On the portion of the river, about 16 miles in length, between the mouth of Bass River and Grand Haven, there are two small tugs engaged in towing gravel to Grand Haven and one gasoline launch making regular trips, but on the upper 23 miles of improved river there is no commerce except the rafting of logs, at times, on the lower portion of this stretch.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$325,000.00
March 3, 1905	100,000.00
March 2, 1907	88,000.00
Miscellaneous receipts	616.15
Total	513,616.15

CONTRACTS IN FORCE.

COAL FOR UNITED STATES GRAND RIVER DREDGES.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.

Rates: F. o. b. government scow at Grand Rapids, Youghiogheny Gas Pool 2, $3.50 per ton; West Virginia Winefrede, $3.50 per ton; Hocking Valley, $3.30 per ton; Saginaw, $3 per ton; Pittsburg No. 8, $3 per ton.

Rates: F. o. b. government scow at Grandville, Mich., Youghiogheny Gas Pool 2, $3.50 per ton; West Virginia Winefrede, $3.50 per ton; Hocking Valley, $3.30 per ton; Saginaw, $3 per ton; Pittsburg No. 8, $3 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.

Rates: F. o. b. government scow at Grand Rapids, Youghiogheny Gas Pool 2, $3.50 per ton; West Virginia Thacker Lump, $3.45 per ton; Hocking Valley, $3.35 per ton; Saginaw, $3.10 per ton; Pittsburg No. 8, $3.15 per ton.

Rates: F. o. b. government scow at Grandville, Mich., Youghiogheny Gas Pool 2, $3.65 per ton; West Virginia Thacker Lump, $3.60 per ton; Hocking Valley, $3.50 per ton; Saginaw, $3.35 per ton; Pittsburg No. 8, $3.30 per ton.

COMMERCIAL STATISTICS.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Baskets	575 dozen	11	$806	18	(a)
Berry boxes	50 fillers	3	112	18	(a)
Berry crates	6,000 pieces	24	865	18	(a)
Cement	100 net tons	100	500	15	(a)
Gravel	18,940 cubic yards	28,410	5,682	15	(a)
Logs	1,000,000 feet	6,000	12,000	24	0.0104
Machinery	50 net tons	50	2,000	15	(a)
Piles	200 pieces	130	1,000	14	(a)
Total		34,728	22,965		

[a] Not known.

Total freight carried:	Tons.
1908	25,913
1909	34,728
Increase	8,815

NOTE.—The above freight was carried on the portion of the river below the mouth of Bass River, with the exception of some of the logs, which were rafted from points farther upstream.

M M 7.

IMPROVEMENT OF MUSKEGON HARBOR, MICHIGAN.

The construction of 1,200 linear feet of north revetment under contract with Burk, Smith & Nelson was completed June 30, 1909, with the exception of the spiking of 756 linear feet of lower guide; this work was done August 24-25, completing the contract. The expenditure, charged to new construction, was $3,816.08.

The contract with Samuel O. Dixon, of June 5, 1909, for dredging the channel for its full width and depth as far as the newly constructed part of the north revetment extends, and to provide the projected depth of 20 feet in other parts of the channel, was completed September 11. The quantity dredged during the fiscal year was 114,962 cubic yards, making the total quantity removed under this contract (June 8 to September 11, 1909) 171,685 cubic yards, and the total cost $26,427.42. The total area dredged was cuts 1 to 4, station 4+00 E. to 29+00 E., cuts 5–6, station 4+00 E. to 34+00 E., and cuts 7–8, station 6+00 W. to 25+00 E., each cut being 30 feet wide and 20 feet deep. The cost is charged to new construction.

All the following-described work is charged to maintenance.

Dredging to restore navigable depths between the piers and on the outer bar was carried on by the *Meade* December 1–21; 23,910 cubic yards were removed, with resulting depths of 22 feet on the outer bar and 20 feet between the piers, station 14+00 W. to 1+00 W. and 27+00 E. to 34+50 E. The expenditures on this account and for dredging in previous fiscal year were $8,780.06.

Soundings made April 29 to May 5, 1910, showed the following available depths: Outside the ends of piers, 22.6 feet on line of north pier, 20.5 feet to 21.2 feet in front of entrance, and 25.2 feet on line of south pier. Between the piers, 22.6 feet at the outer end, and generally 20 feet in center of channel to Muskegon Lake, except a shoal with 19.3 feet in center of channel about 1,100 feet east of the life-saving station.

A contract was entered into August 26, 1909, with Burk, Smith and Nelson for repair of the north pier between stations 6+50.7 and 10+02.7. Operations under the contract were begun September 20 and completed November 19, 1909. The work consisted in removing the old superstructure to the level of zero of gauge, together with the stone filling which was preserved and subsequently replaced in the repaired work, and building a new superstructure 6 feet high and decking same after the stone filling had been replaced. Courses 1 to 5 extend from station 6+50.7 to 10+02.7 and course 6, front wall, 6+37.2 to 10+08.2, and rear wall, 6+50.7 to 10+08.2. The expenditures on account of the contract were $7,063.09.

In November Burk, Smith and Nelson repaired the top course of the channel wall north pier, station 13+50.4 to 13+56.4 W., damaged by schooner *Lyman M. Davis* November 15, 1909, and drove three round piles in the rear of the east end of the north revetment and secured the tops to the rear wall of the superstructure to strengthen the work where the piles had been undermined by recent storms. The cost of repairing the damage by the schooner *Davis*, amounting to $13.67, has been collected from the owner of the vessel.

An emergency contract was entered into with Burk, Smith and Nelson November 23, 1909, for reinforcing the south sheet pile revetment about station 0+35 E. to 6+00 E., with a row of anchor piles in the rear. This work was made necessary by the increased channel depths and increased wave action causing the revetment to lean badly toward the channel. The work was done February 1–26, 1910, and consisted in driving 71 round oak piles, 26 feet long, with tops at 0.5 feet below zero of gauge, about 21.5 feet in rear of the rear row of piles, placing a wale on the new piles and connecting it, by means of tie rods, with the rear piles of the revetment. The piles extend from station 0+41 E. to 5+94 E. and the wale 0+40 to 5+95. The expenditures on account of this work were $1,747.23.

The following miscellaneous repairs were made by day labor in October and November: The top course and the deck of the 50-foot crib station 10+02.7 to 10+52.7 W. were repaired with new cross-ties, new front wall station 10+08.2 to 10+58.2, new rear wall 10+08.2 to 10+36.2, and new deck 10+04 to 10+38.3. Repairs were made as needed to the north pier deck station 10+38.3 W. to the outer end of the pier, and to the south pier deck 9+21.6 W. to the outer end of the pier. Screw bolts in the sheet-pile structures were tightened, and the tops of sheet-piles station 31+59 to 32+00 E. north pier and 2+50 E. to 3+00 E. south pier were bolted to prevent the piles from working up. The expenditures on account of this work were $423.51.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$604,500.00
March 3, 1905	100,000.00
March 2, 1907	75,000.00
March 3, 1909 (allotment Apr. 7, 1909)	22,000.00
June 25, 1910	70,000.00
Miscellaneous receipts	123.67
Total	[b] 871,623.67

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Exclusive of $15.17, refundment of overpayment.

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.10 per ton; West Virginia Winefrede, $3 per ton; Hocking Valley, $2.90 per ton; Saginaw, $2.75 per ton; Pittsburg No. 8, $2.65 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.23 per ton; West Virginia Thacker Lump, $3.20 per ton; Hocking Valley, $2.85 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $2.80 per ton.

DREDGING.

Contractor: Samuel O. Dixon.
Date of contract: June 5, 1909.
Date of approval: June 26, 1909.
Date of beginning: July 10, 1909.
Date of expiration: November 10, 1909.
Rate: 14½ cents per cubic yard measured on or in scows or bins.
Work: Dredging for removal of obstruction and widening channel; approximate 150,000 cubic yards.

CONSTRUCTION OF SHEET-PILE REVETMENT.

Contractor: Burk, Smith & Nelson.
Date of contract: February 17, 1908.
Date of approval: March 4, 1908.
Date of beginning: May 1, 1908.
Date of expiration: September 30, 1908. (Time limit waived.)
Rates: Oak piles, 33 cents per linear foot; oak timber, $60 per thousand; pine or Douglas fir timber, $43 per thousand; pine or Douglas fir planks for sheet piles, $45 per thousand; pine or Douglas fir planks for decking. $42 per thousand: driftbolts, screw bolts, tie rods, carriage bolts, and spikes, 4 cents per pound.

REPAIR OF NORTH PIER.

Contractor: Burk, Smith & Nelson.
Date of contract: August 26, 1909.
Date of approval: September 15. 1909.
Date of beginning: September 15, 1909.
Date of expiration: December 31, 1909.
Rates: Cutting down and removing old work, $2.90 per linear foot; pine or Douglas fir timber, $36 per thousand; pine or Douglas fir plank, $35 per thousand; driftbolts and spikes, 4 cents per pound.

REPAIR OF SOUTH PIER.

(Emergency.)

Contractor: Burk, Smith & Nelson.
Date of contract: November 23, 1909.
Date of beginning: December 15, 1909.
Date of expiration: March 1, 1910.
Rates: Oak piles, 45 cents per linear foot; pine timber, $45 per thousand; tie rods and screw bolts, 5 cents per pound.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened January 29; closed December 18.

Vessel classification.

Class.	Arrivals and departures.	
	American.	Net registered tonnage.
Registered:		
Steamers	1,047	861,474
Sailing	48	7,311
Total	1,095	868,785

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Bunker coal	1,762 net tons	1,702	6,106
Crushed stone	29,430 cubic yards	36,787	29,430
Firewood, 16-inch	90 cords	54	158
Groceries	238 net tons	238	34,580
Lumber	15,406,000 feet	30,812	231,090
Machine parts	432 net tons	432	53,200
Miscellaneous	29,363 net tons	29,363	5,923,060
Paper	285 net tons	285	18,525
Pine lath	198,000 feet	346	2,806
Pine pickets	1,538,000 feet	2,692	28,729
Pulpwood	4,471 cords	10,060	25,038
Refrigerators	445 net tons	445	46,725
Shade rollers	866 net tons	866	173,200
Slabs	1,091 cords	1,636	4,687
Washing machines	5 net tons	5	1,600
Washing-machine supplies	46,700 pounds	23	3,475
Total		115,746	6,580,759

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	115,269
1909	115,746
Increase	477

M M 8.

IMPROVEMENT OF HARBORS AT WHITE LAKE AND PENTWATER, MICHIGAN.

(A) WHITE LAKE HARBOR.

An emergency contract for refilling parts of the piers with stone was entered into with the Leathem & Smith Towing and Wrecking Company July 1, 1908; the work was done August 17–23, 1909. The outer half of the end crib south pier, station 0+40 W. to 0+97.8 W., was refilled with 47 cords of 100-pound stone; the side pockets of the outer end crib north pier, station 1+00 W. to 1+97 W., were refilled with 23 cords of 100-pound stone; and the north pier, station 0+25 E. to 4+98 E., was refilled with 124 cords of 100-pound and 93 cords of 500-pound stone. The cost of this work, charged to maintenance, was $3,090.86.

An emergency contract for dredging between the piers and at the entrance was entered into with Samuel O. Dixon, under date of July 20, 1909, and the work was done August 7–13. At the entrance a channel 120 feet wide and 18 feet deep was dredged west of station 2+00 E. south pier and a channel 60 feet wide and 16 feet deep from station 2+00 E. to 9+00 E., removing 11,335 cubic yards of sand at a cost of $3,164.90, which is charged to maintenance.

Soundings made April 26–27, 1910, showed the following available depths: Outside of the piers 11.5 feet on line of the north pier, 13.1 feet to 15.1 feet in front of the entrance and 18.1 feet on line of the south pier. Between the piers, in center of channel, 14.1 feet at outer end of south pier, 13 feet 400 feet farther east and 14.7 feet farther in. Arrangements have been made for the restoration of the needed depths by the *Meade* early in July. The amount expended for making soundings was $87.69, chargeable to the *Meade*.

(B) PENTWATER HARBOR.

An emergency contract was entered into July 20, 1909, with Samuel O. Dixon for dredging between the piers and at the entrance. The work was done July 28–August 5, removing 14,415 cubic yards of sand at a cost of $3,907.18. A channel 120 feet wide and 18 feet deep was dredged across the bar at entrance, west of the outer end of the north pier, and a channel 60 feet wide and 16 feet deep from the outer end of north pier to station 14+00 E. north pier.

The condition in the spring is shown by soundings of April 21–22, 1910, as follows: Outside of end of piers 14.5 feet on line of the north pier, 13.3 feet to 14 feet in front of entrance and 12.1 feet on line of the south pier; between piers in center of channel 13 feet at entrance, 15 feet inside in a narrow channel to station 8+00 south pier, thence 16 feet or more to Pentwater Lake. To again restore the required depth of navigation, the *Meade* was put at work June 14, and by July 1, 1910, when the dredging was completed, an available depth of 18 feet on the outer bar and 16 feet between piers was produced for the time being. The quantity dredged was 30,588 cubic yards. The expenditures during the year for this work were $70.84.

Under date of June 21, 1910, a contract was entered into with the Muskegon Dock and Dredging Company for repair of the outer end of the north pier about station 0+53 W. to 0+34 E., repair of south revetment station 6+20 to 8+88 and miscellaneous repairs and refilling of piers with stone. No work was done until June 30 when dredging was begun along the channel face of south revetment and was completed from station 8+88 to 7+60. The expenditures on account of the contract were $31.60 for engineering contingencies.

APPROPRIATIONS.

Date.	Pentwater.	White Lake.	Total.
To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$293,820.00	$339,550.00	$633,370.00
March 3, 1905	12,000.00	8,000.00	20,000.00
March 2, 1907	10,000.00	10,000.00	20,000.00
March 3, 1909 (allotment Apr. 23, 1909)	16,000.00	16,000.00	32,000.00
Miscellaneous receipts	....	1,151.30	1,151.30
Total	331,820.00	374,701.30	706,521.30

CONTRACTS IN FORCE, WHITE LAKE HARBOR.

STONE (EMERGENCY).

Contractor: Leathem & Smith Towing and Wrecking Company.
Date of contract: July 1, 1908.
Date of expiration: December 1, 1908. (Time limit waived.)
Work: Furnishing, delivering, and placing stone for filling parts of piers; 87 cords of 500-pound stone, $11.97 per cord, and 157 cords 100-pound stone, $9.23 per cord.

DREDGING (EMERGENCY).

Contractor: Samuel O. Dixon.
Date of contract: July 20, 1909.
Date of beginning: July 24, 1909.
Date of expiration: September 4, 1909.
Rate: 25 cents per cubic yard, measured on scows or in bins.
Work: Dredging for maintenance of channel; approximate 12,000 cubic yards.

PENTWATER HARBOR.

DREDGING (EMERGENCY).

Contractor: Samuel O. Dixon.
Date of contract: July 20, 1909.
Date of beginning: July 24, 1909.
Date of expiration: September 4, 1909.
Rate: 25 cents per cubic yard, measured on scows or in bins.
Work: Dredging for maintenance of channel; approximate 13,000 cubic yards.

REPAIR OF PIERS.

Contractor: Muskegon Dock and Dredging Company.
Date of contract: June 21, 1910.
Date of approval: July 6, 1910.
Date of beginning: July 25, 1910.
Date of expiration: October 1, 1910.
Rates: Cutting down and removing old work, $1.50 per linear foot; oak piles, 36 cents per linear foot; oak timber, $70 per thousand feet, b. m.; pine or Douglas fir timber, $45 per thousand feet, b. m.; hemlock timber, $35 per thousand feet, b. m.; pine or Douglas fir planks for walk and deck, $40 per thousand feet, b. m.; drift bolts, screw bolts, and tie rods, 4 cents per pound; angle irons, 7 cents per pound; spikes, 5 cents per pound; dredging, 50 cents per cubic yard; 300-pound stone and 100-pound stone, $9 per cord; 3-ton stone, $18 per cord.

COMMERCIAL STATISTICS, 1909.

WHITE LAKE HARBOR.

Season of navigation.—Opened March 31; closed December 20.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered:			
Steamers	122	70,342	15,000
Sailing	12	2,184	
Total	[a] 134	72,526	15,000

[a] Does not include numerous pleasure craft and 10 vessels that were known to have used the harbor for refuge.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Butter	17,000 pounds	8	$4,250
Fruit	6,300 bushels	157	9,450
Gravel	2,000 cubic yards	3,000	1,800
Household goods	9,250 pounds	5	925
Knit goods	23,800 pounds	12	23,800
Leather	143,800 pounds	72	71,900
Lumber	2,000,000 feet	4,000	36,500
Miscellaneous	465 net tons	465	82,350
Potatoes	37,800 pounds	18	15,120
Salt	2,000 barrels	300	1,400
Sweeping compound	46,350 pounds	23	927
Tan bark	3,200 cords	3,520	38,400
Total		[a] 11,580	286,822

[a] Does not include 1,578 tons of stone used in connection with the harbor improvement carried on by the United States.

Total freight carried:	Tons.
1908	12,679
1909	11,580
Decrease	1,099

PENTWATER HARBOR.

Season of navigation.—Opened March 5; closed December 20.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered:			
Steamers	530	27,040	[a] 6,847
Sailing	28	876	
Other craft	8	600	
Total	[b] 566	28,516	6,847

[a] Carried by the Pere Marquette Line steamer *John D. Dewe* between the ports of Pentwater and Ludington.

[b] The above was compiled from an itemized statement, furnished by local parties, using only such items as would be admissible in comparing the vessel movement of this harbor with that of other ports in this district. The statement furnished by the local parties showed 3,492 arrivals and departures, which included numerous small fishing and pleasure craft, dredge tenders, and Government vessels engaged in the maintenance of the harbor works.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Cedar posts	1,200 pieces	21	$150
Crushed stone	1,700 cubic yards	2,125	1,955
Lath	65,000	20	228
Lumber	65,000 feet	130	1,300
Miscellaneous merchandise and fruit	2,248 net tons	2,248	281,440
Potatoes	300 bushels	9	120
Seed peas	2,629 bushels	79	9,202
Shingles	75,000	7	262
Total		4,639	294,657

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	2,431
1909	4,639
Increase	2,208

MM 9.

IMPROVEMENT OF LUDINGTON HARBOR, MICHIGAN.

The construction of the two breakwaters under continuing contract with L. E. Schnorbach & Co., was continued. The condition of the work June 30, 1909, was as follows: In the north breakwater two cribs were in place at the outer end, the superstructure over the cribs was partly completed, the guard structure at the outer end was completed and two additional cribs were ready to sink; in the south breakwater six cribs, with a total length of 600 feet, were in place at the outer end, but the east end of crib 4 had been seriously damaged by the storms of December, 1908, and needed extensive repairs. The superstructure was built for about 350 feet from the outer end and filled with stone and decked, the guard structure at the outer end was completed, 3,420 tons of riprap placed around the outer four cribs, and two additional cribs were built. At the end of the working season of 1909 the following work had been done: The north breakwater had been extended by seven cribs and the superstructure completed over them and over the two cribs sunk the previous year, the whole filled with stone and decked over, making a total of 900 feet of completed breakwater; 8,461 tons or riprap had been placed around the nine cribs; foundations had been dredged in advance for cribs 10 and 11; and crib 10 had been built ready to sink and the foundation piles driven. Each crib is 100 feet long, 30 feet wide, and varying in depth from 24½ feet for crib 1, at the outer end, to 18½ feet for crib 9 at the shoreward end of the north breakwater. The south breakwater had been extended by three cribs, making a total length of 900 feet; the damaged end of crib 4 had been repaired and the superstructure had been built from where it ended in 1908 to points ranging from station 7+95 in the first course to 4+43 in the sixth or top course; the superstructure had been only partly filled with stone and no decking had been placed; 6,816 tons of riprap had been placed around the nine cribs; foundations had been dredged in advance for cribs 10 and 11 and crib 10 had been built ready to sink. Each crib is 100 feet long, 30 feet wide and varying in depth from 26½ for cribs 1 and 2, at the outer end, to 22½ feet for crib 9 at the shoreward end of the south breakwater.

During the severe storm of October 10–16, 1909, the south breakwater was badly damaged. The superstructure over cribs 5 to 9, inclusive, being only partly filled with stone, and, for this reason, very insecure, was badly wrecked; cribs 5 and 6 were moved on the foundation and the lake side wall was torn open in several places at an elevation of about 10 feet below water surface and the cribs and superstructure were badly canted over toward the harbor side; cribs 7 and 8 were slightly damaged; crib 9, at shoreward end, was moved, but still remained on the foundation piles. The riprap along both sides of both the south and the north breakwaters settled very considerably as a result of the storm. Repairs were at once begun to the damaged portions of the superstructure on the south breakwater by removing broken timbers, placing temporary deck, etc. A second storm, November 16–17, carried away some of the temporary deck and additional parts of the uncompleted superstructure. A third storm, December 5–6, carried away six courses of the harbor side wall about station 3+70 to 3+90, and more of the temporary deck. The damage to cribs 5 and 6 was so extensive that it was found necessary to order their removal and reconstruction.

Work was resumed March 28, 1910, and since then the following has been done up to June 30:

The north breakwater has been extended by four cribs, making a total length of 1,300 feet; the superstructure has been built in varying lengths to station 11+95 in course 1, and to station 11+47 in course 6, and partly filled with stone; 2,058 tons of riprap have been placed around cribs 1 to 6, inclusive, where settlement has taken place, and 2,812 tons around cribs 9 to 13; dredging for foundation sites has been completed for cribs 12 to 18, inclusive, one additional crib has been built, and foundation piles driven for two additional cribs.

The south breakwater has been extended by four cribs, making the total present length 1,300 feet; the damaged portions of cribs 4, 7, 8, and 9 have been repaired; the superstructure has been completed, filled with stone, and decked over crib 4 and from station 6+00 (the west end of crib 7) to 8+90, and built in varying lengths thence to 11+93, in course 1, and 9+47, in course 6, and partly filled with stone; 2,137 tons of riprap have been placed; dredging for foundation sites has been completed for cribs 12 to 18, inclusive; and one crib has been built ready to sink and foundation piles driven for same. The work of removing stone from cribs 5 and 6, south breakwater, preliminary to the removal of the cribs themselves, was begun June 5, the total amount removed to the end of the fiscal year being 1,302 tons. The expenditures on the above work for the fiscal year were $248,399.14.

The deck and top course of the completed portion of the south breakwater between stations 0 and 3+50 were also damaged by the storms of the late fall of 1909, and the needed repairs were made under special agreement with L. E. Schnorbach & Co., and under the same agreement 28 cords stone were added to the filling in the outer end pockets of the completed portion of the north breakwater. The expenditure on account of north breakwater, charged to maintenance, was $313.60. Payment has not yet been made for repairs to south breakwater.

The channel between the piers and across the outer bar was dredged by the *Meade* October 11 to November 4, 1909, and 31,460 cubic yards removed, with resulting depths of 20.6 feet between the piers and 22 feet on the outer bar. The cost, charged to maintenance, was $4,683.12.

Soundings made May 13–16 showed the following available depths: Outside of the entrance to the breakwaters, 30 feet; between the entrance to the breakwaters and the outer end of the interior piers, 19 to 19.9 feet; and between the interior piers, for a width of 60 feet in the center of the channel, 20 feet.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$219,087
For maintenance of improvement	10,000
	[a]229,087

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$488,435.00
March 3, 1903	165,000.00
March 3, 1905	10,000.00
March 2, 1907	100,000.00
May 27, 1908	20,000.00
March 4, 1909	200,000.00
March 3, 1909 (allotment Apr. 7, 1909)	8,000.00
June 25, 1910	310,000.00
Miscellaneous receipts	.42
Total	1,301,435.42
Amount carried to surplus fund, 1872	.90
Balance	1,301,434.52

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.30 per ton; West Virginia Winefrede, $3.20 per ton; Hocking Valley, $3 per ton; Saginaw, $2.80 per ton; Pittsburg No. 8, $2.85 per ton.

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[a] Exclusive of the balance unexpended July 1, 1910.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.

Rates: Youghiogheny Gas Pool 2, $3.43 per ton; West Virginia Thacker Lump, $3.40 per ton; Hocking Valley, $3.05 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $3 per ton.

CONSTRUCTION OF BREAKWATERS, CONSISTING OF CRIB WORK.

(Continuing contract.)

Contractor: L. E. Schnorbach & Co.
Date of contract: December 10, 1907.
Date of approval: December 26, 1907.
Date of beginning: April 15, 1908.
Date of expiration: Indefinite.

Rates: Dredging for crib foundation, 50 cents per cubic yard, place measurement; foundation piles, 75 cents per linear foot; oak guard piles, 40 cents per linear foot; oak timber, $60 per thousand; white, Norway, or southern pine or Douglas fir timber, $45 per thousand; hemlock timber, $30.20 per thousand; white, Norway, or southern pine or Douglas fir planks for decking, $45 per thousand; driftbolts and screw bolts, 4 cents per pound; spikes, 5 cents per pound; stone weighing 50 to 100 pounds each, $1.59 per ton of 2,000 pounds; stone weighing 500 pounds or more each, $1.89 per ton of 2,000 pounds.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Open the entire year.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered steamers and sailing	4,900	6,398,806	26,135

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Bark	140 cords	154	$1,400
Barley	626,858 bushels	15,045	376,115
Barrel staves	1,516,000	758	5,761
Beer	1,757 net tons	1,757	35,140
Bran	27,900 net tons	27,900	558,000
Bunker coal	41,537 net tons	41,537	124,611
Cedar posts	13,500 pieces	237	1,350
Cement	2,170 net tons	2,170	10,850
Coal, hard	54,048 net tons	54,048	310,690
Coal, soft	346,570 net tons	346,570	948,769
Copper	18,785 net tons	18,785	5,259,800
Corn	2,607,257 bushels	73,000	1,564,354
Feed	5,761 net tons	5,761	115,220
Flaxseed	930 bushels	26	1,860
Flour	1,027,959 barrels	100,740	5,139,795
Fruit	10,095 bushels	252	15,120
Grain	6,950 bushels	174	3,475
Hay	757 net tons	757	7,570
Iron	9,192 net tons	9,192	367,680

Freight traffic—Continued.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Logs	336,900 feet	2,016	$4,082
Lumber	102,205 feet	204,410	1,612,232
Machinery	3,350 net tons	3,350	335,000
Malt	14,950 net tons	14,950	897,000
Manufacturing iron	20,103 net tons	20,103	804,120
Middlings	414 net tons	414	8,280
Miscellaneous	500,125 net tons	500,125	90,022,500
Oats	4,250,999 bushels	68,016	1,700,400
Paper	12,044 net tons	12,044	722,640
Pig iron	20,746 gross tons	23,235	373,428
Plaster	6,285 net tons	6,285	23,569
Potatoes	107,780 bushels	3,233	43,112
Rye	296,350 bushels	8,298	148,175
Salt	151,710 net tons	151,710	406,332
Sand	125 net tons	125	125
Shingles	100,000	10	200
Soda ash	269 net tons	269	13,450
Stone	376 net tons	376	376
Stone, crushed	5,105 cubic yards	6,381	5,105
Straw	10 net tons	10	60
Sugar	5,071 net tons	5,071	507,100
Wood	4,151 cords	6,226	18,679
Wheat	150,547 bushels	4,516	135,492
Total		[a] 1,740,036	112,628,967

[a] Does not include 60,814 tons stone used in connection with the harbor improvement carried on by the United States.

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	1,416,560
1909	1,740,036
Increase	323,476

M M 10.

IMPROVEMENT OF MANISTEE HARBOR, MICHIGAN.

Work under the contract of April 24, 1909, with Robert Love, for repairing the north pier between stations 7+69 and 12+38.7, which was begun May 20, was continued from where the work ended June 30, as described on page 2046 of the annual report for 1909, and was completed August 12. The work done consisted in strengthening the substructure with sheet piles and round piles in the front wall and round piles in the rear wall, and with wales and tie rods, and the building of a new superstructure 4 feet high in the front wall and 2 feet high in the rear wall. The amount expended during the year on this work was $11,497.60.

Between July 30 and August 17, 1909, the *Meade* removed 39,755 cubic yards from between the piers and on the outer bar, with resulting depths of 18 feet between the piers and 20 on the outer bar; October 9 she removed 1,556 cubic yards from the outer bar, and November 5–23 32,063 cubic yards, mostly from the outer bar, with resulting depths of 18 feet between the piers and 20 feet on the outer bar. The total quantity dredged was 73,374 cubic yards. The expenditures for this work were $6,889.02.

By special agreement with John Smith a shoal was removed from Manistee River from about station 39+00 to 43+00; three cuts were dredged, giving a total width of 75 feet and depth of 17 feet, removing 1,698 cubic yards. The work was done November 16–20, at a cost of $480.03.

All of the above-described work comes under the head of maintenance.

Soundings made May 18–25, 1910, showed the following available depths: Outside the ends of piers, 21 feet on line of the north pier, 20.6 to 21 feet in front of the entrance, and 18.3 feet on line of the south pier; between the piers 18.3 feet at outer end, thence 18 feet to inner end of the south pier, thence 16 feet to Maple street bridge, and thence 15.4 feet to Manistee Lake.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:		
For works of improvement	$4,000	
For maintenance of improvement	6,000	
		[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To July 12, 1892 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$298,000.00
July 13, 1892	50,000.00
August 18, 1894	12,000.00
June 3, 1896	15,000.00
March 3, 1899	20,000.00
June 13, 1902	42,000.00
March 3, 1905	10,000.00
March 2, 1907	25,000.00
June 25, 1910	33,000.00
Miscellaneous receipts	24.87
Total	505,024.87

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.30 per ton; West Virginia Winefrede, $3.20 per ton; Hocking Valley, $3 per ton; Saginaw, $2.80 per ton; Pittsburg No. 8, $2.85 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.43 per ton; West Virginia Thacker Lump, $3.40 per ton; Hocking Valley, $3.05 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $3 per ton.

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[a] Exclusive of the balance unexpended July 1, 1910.

REPAIR OF NORTH PIER.

Contractor: Robert Love.
Date of contract: April 24, 1909.
Date of approval: May 7, 1909.
Date of beginning: May 1, 1909.
Date of expiration: October 31, 1909.

Rates: Cutting down and removing old work, $1.50 per linear foot; oak piles, 33 cents per linear foot; oak timber, $60 per thousand; pine or Douglas fir timber, $38 per thousand; pine or Douglas fir plank for sheet piles, $42 per thousand; pine or Douglas fir plank for walk, $40 per thousand; driftbolts, screw bolts, carriage bolts, tie-rods and spikes, 3½ cents per pound.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Open the entire year.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered:			
Steamers	2,032	1,204,740	23,000
Sailing	118	15,322	....
Total	2,150	1,220,062	23,000

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Bark	4,010 cords	4,411	$40,100
Barrel headings	111,323 sets	223	4,453
Barrel staves	1,924,050 pieces	962	7,311
Bunker coal	7,369 net tons	7,369	22,107
Coal, hard	575 net tons	575	3,306
Corn	1,600 bushels	45	960
Crushed stone	3,790 cubic yards	4,738	3,790
General merchandise	23,550 net tons	23,550	4,239,000
Hay	272 net tons	272	3,808
Lumber	70,648,000 feet	141,296	1,060,370
Oats	42,200 bushels	675	16,880
Salt	255,251 net tons	255,251	574,315
Shingles	2,316,000	231	5,790
Total		439,598	5,982,190

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	428,084
1909	439,598
Increase	11,514

M M II.

HARBOR OF REFUGE AT PORTAGE LAKE, MANISTEE COUNTY, MICHIGAN.

Dredging for maintenance by the *Meade* began September 21 and continued until October 8, when the available funds were exhausted and the work stopped. The depths before dredging were 16 feet and 14.3 feet between piers and on the outer bar, respectively, and the corresponding depths after dredging were 17.4 feet and 18.1 feet. The total quantity removed was 39,486 cubic yards and the expenditures, $2,665.43.

Soundings made May 26–27 showed the following available depths: Outside the ends of piers, 18.8 feet on line of the north pier, 18.3 feet in front of the entrance, and 20.3 feet on line of the south pier; between the piers, 19.8 feet at the outer end, and inside, 18 feet in the center of the channel.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912:	
For works of improvement	$13,000
For maintenance of improvement	3,000
	[a] 16,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To September 18, 1890 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$92,500
September 19, 1890	8,000
August 18, 1894	25,000
June 3, 1896	25,000
March 3, 1899	75,000
June 6, 1900	85,000
June 13, 1902	59,000
March 2, 1907	10,000
June 25, 1910	13,000
Total	392,500

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened April 1; closed December 8.

Vessel classification.

Class.	Arrivals and departures.	
	American.	Net registered tonnage.
Registered steamers	456	145,688

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[a] Exclusive of the balance unexpended July 1, 1910.

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Miscellaneous merchandise and fruit	2,173 net tons	2,173	$171,925

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	3,441
1909	2,173
Decrease	1,268

M M 12.

IMPROVEMENT OF HARBOR AT ARCADIA, MICHIGAN.

There were no operations at this harbor during the fiscal year, except the making of soundings, owing to the fact that the approved project is completed.

Soundings made May 28 to June 3, 1910, showed the following available depths: Outside of the end of the south pier 12.6 feet on line of the north pier, 12.9 feet in front of the entrance, and 11.7 feet on line of the south pier; between the piers, at outer end of south pier 16 feet next to pier and 8.3 feet in mid-channel, and 6.8 feet in mid-channel near the south shore line. No evidence remains of the dredging done in June, 1909.

The sum of $2,921.05 was expended during the fiscal year on account of dredging done in June, 1909, under contract, and for making soundings in spring of 1910.

APPROPRIATIONS.

March 3, 1905	$6,000
March 2, 1907	6,000
March 3, 1909 (allotted Apr. 9, 1909)	3,000
Total	15,000

CONTRACT IN FORCE (EMERGENCY).

DREDGING.

Contractor: John Smith.
Date of contract: June 5, 1909.
Date of beginning: June 15, 1909.
Date of expiration: July 15, 1909.
Rate: 19¾ cents per cubic yard, scow measurement.
Work: Maintenance of channel.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened April 1; closed December 8.

Vessel classification.

Class.	Arrivals and departures.	
	American.	Net registered tonnage.
Registered steamers	606	71,508

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Furniture and fruit	4,111 net tons	4,111	$328,880
Miscellaneous	167 net tons	167	16,700
Total		4,278	345,580

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	2,975
1909	4,278
Increase	1,303

M M 13.

IMPROVEMENT OF HARBOR AT FRANKFORT, MICHIGAN.

Work by Burk, Smith & Nelson on their contract for repairing and extending the south pier at its outer end, begun in June, 1908, was delayed by failure to secure stone for sinking the crib until early in August, 1909, when stone was received. The crib was sunk August 5; the superstructure built 6 courses high, filled with stone and decked; the guard structure completed at the outer end and 130 cords of riprap placed along both sides and the outer end. The contract was completed September 8. The crib is 30 feet wide, 18½ feet deep, 100 feet long in the lower 13 courses, and 106 feet long in the upper 5 courses; the superstructure steps back on the old work in lengths varying from 110 feet in the bottom course to 135.5 feet in the top course; the outer end of the crib is at station 20+012. Part of this crib went to replace the shattered end of the pier, and the actual length by which the pier was extended by the addition of this crib was 63 feet. The expenditure on account of this contract was $16,931.74, 60 per cent of which is charged to new work and 40 per cent to maintenance.

Under contract of March 1, 1909, for repairing the inner end of the south pier from station 0+89.6 to 1+86.6, Burk, Smith & Nelson began construction work July 1; the dredging to remove the old work and prepare the site for the new had been done in May, 1909. The new structure is a sheet-pile revetment with round piles, sheet piles, wale, guides, and binder in the front row and round piles and wale in the rear row, the two wales being connected by tie rods; resting on the round piles is a superstructure 4 feet high in the front wall and 2 feet high in the rear wall. The work is filled with stone to the level of zero of gauge and completed with a plank walk. The contract was completed September 4. The cost of this work, which is charged to maintenance, was $4,079.76.

The following miscellaneous repairs were made: Burk, Smith & Nelson placed 34.4 cords of stone filling in the south pier, station 8+50 to 8+58 and 14+20 to 16+35. By day labor and purchased materials the decking on south pier was repaired as needed, station 2+36 to 18+14. The front wale, south pier, was repaired, station 2+68 to 2+88; these repairs were made in September, 1909. Temporary repairs were made, November 24 to December 3, to the outer end of the new crib at outer end of the south pier, which was damaged by one of the car ferries October 16, 1909; permanent repairs will have to be made in the future. The expenditures for the above work, charged to maintenance, were $282.47.

Dredging by the *Meade* was in progress September 4–21, 1909, and 39,795 cubic yards were removed from between the piers and from the outer bar. The available depths were increased from 18.1 to 20 feet between the piers and from 19.6 to 22 feet on the outer bar. The cost of the work was $3,240.64.

Soundings of June 4–6, 1910, show the following available depths: Outside the ends of piers 22.6 feet on line of the north pier, 20.9 to 22.1 feet in front of the entrance, and 21.2 feet on line of the south pier, between the piers 20 feet in the center of the channel, with a depth of 18 feet for a width of 80 feet throughout.

The front wale, north pier, station 9+60 to 9+70, broken by the steamer *Missouri* June 11, 1909, was repaired and the cost of same, $34.17, was afterwards refunded by the owners of the vessel. The repairs were made in September, 1909.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

To June 2, 1896 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$333,659.85
June 3, 1896	15,000.00
March 3, 1899	35,000.00
June 13, 1902	54,500.00
March 3, 1905	20,000.00
March 2, 1907	20,000.00
June 25, 1910	20,000.00
Miscellaneous receipts	37.09
Total	498,196.94
Amount covered into the Treasury	5,721.50
Balance	492,475.44

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACTS IN FORCE.

EXTENSION AND REPAIR OF SOUTH PIER.

Contractor: Burk, Smith & Nelson.
Date of contract: April 2, 1908.
Date of approval: May 6, 1908.
Date of beginning: May 22, 1908.
Date of expiration: November 1, 1908 (time limit waived).
Rates: Cutting down and removing old work, lump sum of $500; dredging for crib foundations, 50 cents per cubic yard; foundation piles, 65 cents per linear foot; oak guard piles, 60 cents per linear foot; oak timber, $60 per thousand; hemlock timber, $30 per thousand; white, Norway, or southern pine or Douglas fir timber, $42 per thousand; white, Norway, or southern pine or Douglas fir planks, for decking, $40 per thousand; driftbolts, screw bolts, and spikes, 4 cents per pound; stone, $9 per cord of 128 cubic feet.

REPAIR OF SOUTH PIER.

Contractor: Burk, Smith & Nelson.
Date of contract: March 1, 1909.
Date of approval: March 10, 1909.
Date of beginning: May 1, 1909.
Date of expiration: August 31, 1909 (time limit waived).
Rates: Dredging, 85 cents per cubic yard; oak piles, 40 cents per linear foot; oak timber, $70 per thousand; pine or Douglas fir timber, $40 per thousand; pine or Douglas fir plank for sheet piles, $45 per thousand; pine or Douglas fir plank for walk, $36 per thousand; driftbolts, screw bolts, carriage bolts, tie-rods, and spikes, 4 cents per pound; stone filling, $8 per cord of 128 cubic feet.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Time of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.30 per ton; West Virginia Winefrede, $3.20 per ton; Hocking Valley, $3 per ton; Saginaw, $2.80 per ton; Pittsburg No. 8, $2.85 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.43 per ton; West Virginia Thacker lump, $3.40 per ton; Hocking Valley, $3.05 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8; $3 per ton.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Open the entire year.

Vessel classification.

Class.	Arrivals and departures.				Passengers carried.
	American.	Foreign.	Total.	Net registered tonnage.	
Registered:					
Steamers	2,133	8	2,141	1,825,707	6,908
Sailing	44	6	50	6,988	....
Total	2,177	14	2,191	1,832,695	6,908

Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Apples	3,872 bushels	97	$2,904
Barley	381,400 bushels	9,153	228,840
Berries	2,216 cases	28	2,216
Bran	360 net tons	360	7,200
Coal, bunker	22,650 net tons	22,650	67,950
Coal, hard	950 net tons	950	5,462
Coal, soft	221,630 net tons	221,630	620,564
Copper	1,944 net tons	1,944	544,320
Corn	71,550 bushels	2,003	42,930
Fish	10 net tons	10	1,600
Flour	11,344 net tons	11,344	567,200
Hay	503 net tons	503	5,030
Iron, manufactures	11,116 net tons	11,116	444,640
Iron ore	23,409 gross tons	26,218	85,443
Iron, pig	17,060 gross tons	17,060	307,080
Logs	90,000 feet	540	900
Lumber	68,618,000 feet	137,236	1,029,270
Malt	6,250 net tons	6,250	375,000
Mill stuff	511 net tons	511	10,220
Miscellaneous	165,079 net tons	165,079	29,714,220
Oats	956,300 bushels	15,300	382,520
Peaches and pears	5,192 packages	28	2,596
Potatoes	10,000 bushels	300	4,000
Railroad ties	86,092 pieces	3,659	34,437
Rye	204,600 bushels	5,729	102,300
Salt	5,356 net tons	5,356	19,282
Shingles	750,000	75	2,250
Slabs	975 cords	1,463	2,925
Timber, export	50,000 feet	100	2,000
Wheat	9,000 bushels	270	8,100
Wood	75 cords	188	225
Total		[a] 669,197	34,623,624

[a] Does not include 4,548 tons of stone received and used in connection with the harbor improvement carried on by the United States.

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	563,332
1909	669,197
Increase	105,865

M M 14.

IMPROVEMENT OF CHARLEVOIX HARBOR, MICHIGAN.

From August 18 to September 3, 1909, the *Meade* was engaged in dredging for maintenance of the channel and removed 32,004 cubic yards from the outer bar, from between the entrance piers, station 13+00 north pier to outer end, and in the Round Lake entrance to the upper channel; the available depths in the three places were increased, respectively, from 17 to 20.1 feet, from 15.5 to 19.7 feet, and from 15.8 to 17.8 feet. The dredging on the outer bar was extended to form basins on each side of the entrance. The cost of the work was $2,773.16.

Soundings of June 8–10, 1910, show the following available depths: Outside the end of piers 19.2 feet on line of the north pier, 20 feet in front of the entrance, and 14.4 feet on line of the south pier at a distance of 70 feet from the end of the pier, and 20 feet 200 feet from the end of the pier. Between the piers: Lower channel, 20 feet in center of channel at outer end of the north pier and 16.9 feet at the shore line; upper channel, 17 feet.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$175,500.00
March 3, 1905	25,000.00
March 2, 1907	20,000.00
March 3, 1909 (allotted Apr. 23, 1909)	6,000.00
Miscellaneous receipts	119.65
Total	226,619.65

CONTRACTS IN FORCE.

COAL FOR U. S. DREDGE MEADE.

(Emergency contract.)

Contractor: S. P. Bennett Fuel and Ice Company.
Date of contract: March 24, 1909.
Date of beginning: March 24, 1909.
Date of expiration: December 31, 1909.
Rates: Youghiogheny Gas Pool 2, $3.30 per ton; West Virginia Winefrede, $3.20 per ton; Hocking Valley, $3 per ton; Saginaw, $2.80 per ton; Pittsburg No. 8, $2.85 per ton.

Contractor: Century Fuel Company.
Date of contract: March 25, 1910.
Date of approval: April 12, 1910.
Date of beginning: April 12, 1910.
Date of expiration: December 31, 1910.
Rates: Youghiogheny Gas Pool 2, $3.43 per ton; West Virginia Thacker Lump, $3.40 per ton; Hocking Valley, $3.05 per ton; Saginaw, $2.85 per ton; Pittsburg No. 8, $3 per ton.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened April 1; closed December 26.

Vessel classification.

Class.	Arrivals and departures.				Passengers carried.
	American.	Foreign.	Total.	Net registered tonnage.	
Registered:					
Steamers	588	2	590	844,234	3,003
Sailing	67		67	19,901	
Total	655	2	[a] 657	864,135	3,003

[a] Not including vessels calling at Boyne City and East Jordan that did not report to the custom-house at Charlevoix.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.
Apples	400 barrels	11	$337
Bunker coal	54 net tons	54	162
Cedar posts	1,700 pieces	30	170
Coal, hard	350 net tons	350	2,013
Coal, soft	1,875 net tons	1,875	5,250
Corn	62,686 bushels	1,755	37,612
Crushed stone	1,568 cubic yards	1,960	1,882
Feed	32 net tons	32	640
Hay	20 net tons	20	200
Ice	600 net tons	600	120
Iron ore	56,719 gross tons	63,525	207,024
Iron, pig	2,779 gross tons	3,112	50,022
Lath	180,000	54	495
Lumber	73,168,000 feet	146,336	1,316,874
Miscellaneous	3,585 net tons	3,585	645,300
Oats	5,500 bushels	88	2,200
Oil and tar	40 barrels	8	300
Potatoes	16,000 bushels	480	6,400
Salt	10 barrels	2	7
Sash and doors	35 net tons	35	3,500
Shingles	20,000	2	50
Slabs	1,124 cords	1,686	3,372
Tan bark	620 cords	682	6,200
Tanners' supplies	1,560 net tons	1,560	59,817
Wheat	3,800 bushels	114	3,420
Total		227,956	2,353,367

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:[a]	Tons.
1908	45,211
1909	227,956
Increase	[a] 182,745

MM 15.

IMPROVEMENT OF PETOSKEY HARBOR, MICHIGAN.

There have been no operations of construction or maintenance at this harbor during the fiscal year.

APPROPRIATIONS.

To December 31, 1902 (as per H. Doc. No. 421, 57th Cong., 2d sess.)	$88,000
March 3, 1905	20,000
March 2, 1907	17,500
June 25, 1910	20,000
Total	145,500

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[a] The total freight given for 1908 does not include that of Boyne City and East Jordan, which was not reported to the custom-house at Charlevoix, while the total freight given for 1909 includes all freight to and from Boyne City and East Jordan, although only a part of the latter entered and cleared at the custom-house at Charlevoix.

COMMERCIAL STATISTICS, 1909.

Season of navigation—Opened April 12; closed December 8.

Vessel classification.

Class.	Arrivals and departures.		Passengers carried.
	American.	Net registered tonnage.	
Registered steamers	240	319,212	1,456

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Miscellaneous merchandise	3,250 net tons	3,250	$585,000

Average haul or distance freight was carried and rate per ton-mile not known.

Total freight carried:	Tons.
1908	858
1909	3,250
Increase	[a] 2,392

M M 16.

U. S. DREDGE GENERAL G. G. MEADE.

The dredge *Meade*, belonging to the United States, is of the seagoing suction type, built in 1904 at Sparrow Point, Md. Her dimensions are as follows:

Length over all, 177 feet.
Length between perpendiculars, 166 feet.
Draft light, forward 9 feet, aft 12 feet.
Draft loaded, forward 19 feet, aft 17 feet.
Beam molded, 38 feet.
Depth molded, 19 feet.
Displacement, in tons of 2,000 pounds, light, 1,633; loaded, 2,908.
Capacity of bins, fully loaded, 935 cubic yards.
Two propelling engines, each 15 and 30 by 24 inches.
Two pumping engines, each 11 and 22 by 24 inches.
Two sand pumps, each 15 inches.
Size of suction, 15 inches.
Size of boilers, 12 by 13 feet.
Finished cost, with outfit, $177,953.

The circumstances under which the dredge is obliged to work affect unfavorably the final cost per unit. When loaded the dredge draws too much for many of the harbors of the district. The dredge can not, therefore, steam freely over the shoals and is often obliged to proceed to the dumping grounds with bins only partly loaded. Moreover, the channels are too narrow and the dredge often has to back to the site of the work. Quantities at each harbor are generally small and to the cost of actual dredging must be added that of moving over a district the extreme harbors of which are 280 miles apart.

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[a] The report for 1908 included only the receipts and shipments as entered and cleared through the local custom-house, and this report, doubtless, did not include all freight carried.

Under extremely favorable conditions the dredge has been able to dredge a maximum of slightly more than 4,000 cubic yards in eight hours of actual dredging, but the average at all harbors and under all circumstances is about 2,600 yards per day.

The following table gives a statement of results of operating the dredge during the fiscal year ending June 30, 1910:

Appropriations for—	Dredge Meade.	Surveys, examinations, etc.	Office and contingent expenses, etc.	Total.	Cubic yards dredged.
St. Joseph Harbor	$3,995.60	$218.41	$60.63	$4,274.64	45,120
South Haven Harbor	6,994.05	149.55	325.22	7,468.82	78,745
Saugatuck Harbor	1,397.85	172.67	16.77	1,587.29	42,762
Holland Harbor	2,929.87	226.02	146.49	3,302.38	17,538
Grand Haven Harbor	2,993.25	168.23	151.75	3,313.23	32,637
Muskegon Harbor	8,235.96	141.55	402.55	8,780.06	24,740
White Lake Harbor	....	87.69	....	87.69	....
Pentwater Harbor	23.00	47.84	....	70.84	28,431
Ludington Harbor	4,449.86	99.32	133.94	4,683.12	31,460
Manistee Harbor	6,348.52	204.03	336.47	6,889.02	73,374
Portage Lake Harbor	2,567.51	52.09	45.83	2,665.43	39,496
Frankfort Harbor	3,018.15	80.64	141.85	3,240.64	39,795
Charlevoix Harbor	2,589.57	116.34	67.25	2,773.16	32,004
Total	45,543.19	1,764.38	1,828.75	49,136.32	486,102
Cost per cubic yard......cents	9.369	.362	.376	10.108	....

APPENDIX N N.

IMPROVEMENT OF RIVERS AND HARBORS IN THE DETROIT, MICHIGAN, DISTRICT.

REPORT OF COL. C. McD. TOWNSEND, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Ship channel connecting waters of the Great Lakes between Chicago, Duluth, and Buffalo.
2. St. Marys River at the Falls, Michigan.
3. Operating and care of St. Marys Falls Canal, Michigan.
4. Hay Lake and Neebish channels, St. Marys River, Michigan.
5. Mackinac Harbor, Michigan.
6. Cheboygan Harbor, Michigan.
7. Rogers City Harbor, Michigan.
8. Alpena Harbor (Thunder Bay River), Michigan.
9. Saginaw River, Michigan.
10. Sebewaing River, Michigan.
11. Harbor of refuge at Harbor Beach, Lake Huron, Michigan.
12. Mouth of Black River, Rouge River, and Monroe Harbor, Michigan.
13. Black River at Port Huron, Michigan.
14. Operating and care of St. Clair Flats Canal, Michigan.
15. Clinton River, Michigan.
16. Detroit River, Michigan.
17. Removing sunken vessels or craft obstructing or endangering navigation.

United States Engineer Office,
Detroit, Mich., July 20, 1910.

Sir: I have the honor to submit herewith the annual report relative to the works under my charge during the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

C. McD. Townsend,
Colonel, Corps of Engineers.

The Chief of Engineers, U. S. Army.

N N 1.

IMPROVEMENT OF SHIP CHANNEL CONNECTING WATERS OF THE GREAT LAKES BETWEEN CHICAGO, DULUTH, AND BUFFALO.

The work under the project approved October 20, 1892, contemplated a navigable depth of 20 feet at mean stage of water by the excavation of channels, having a minimum width of 300 feet, through the shallows of the connecting waters of the Great Lakes between Chicago, Duluth, and Buffalo. The improved channels were made available in 1897, but, as the water levels have been continuously below the mean stage, the actual navigable depth has been from 1 to 3 feet less than the 20 feet contemplated.

The subproject approved October 16, 1902, provided for the expenditure of the balance of the appropriation then available in widening and deepening the channel at certain critical points to a depth of 21 feet below the low-water reference planes therein suggested, these planes being based on a stage of 601.5 feet for Lake Superior and 578.8 feet for Lake Huron and 571 for Lake Erie, referred to mean tide at New York by system of levels then existing. All of this balance has now been expended.

The total expenditures to June 30, 1910, was $3,340,000 in addition to $3,849.21 expended from an allotment of $25,000 appropriated by the river and harbor act of March 3, 1909, for "Preservation and maintenance of river and harbor works."

The only work done during the fiscal year was the making of a survey of shoal in St. Clair River opposite Port Huron, Mich., and the enforcement of rules and regulations for navigating Stag Island channel in St. Clair River.

APPROPRIATIONS.

July 13, 1892	$375,000
March 3, 1893	875,000
March 2, 1895	500,000
June 11, 1896	500,000
June 4, 1897	1,090,000
Allotment dated April 7, 1909, from appropriation of March 3, 1909, for "Preservation and maintenance of river and harbor works"	25,000
Total	3,365,000

N N 2.

IMPROVEMENT OF ST. MARYS RIVER AT THE FALLS, MICHIGAN.

The work in progress comprises the construction of a movable dam, canal gates, etc., covered by the project of 1886 and its extensions; also the canal widening and further improvements authorized by the river and harbor act of June 13, 1902, and the construction of a new lock and canal provided for by the river and harbor act of March 2, 1907.

The operations for the fiscal year were as follows:

The work of widening the present canal above the locks consists in excavating earth and rock from an area about 3,700 feet long and averaging 125 feet in width to a depth of 24.6 feet below 601.5 feet, and constructing the necessary revetment walls. Under contract for this work, dated March 23, 1908, the Great Lakes Dredge and Dock Company have continued operations with an average plant of 1 compressor, 2 shovels, 1 channeler, 9 drills, 5 locomotives, 30 cars, and other auxiliary plant. Two dredges, 1 derrick scow, and a drill boat have been employed during a part of the year. The work accomplished during the year included the excavation of 61,478 cubic yards class A, 132,892 cubic yards class B, full rate, and 3,674 cubic yards class B, half rate; 21,134 square feet of channeling, 8,466 cubic feet of timber framed and placed, 1,852 cubic yards of filling, and 22,178 cubic yards of concrete in canal walls. Under supplemental agreement dated August 12, 1909, the contractor placed 3,950.3 cubic yards of concrete for sills and abutments of canal gate and movable dam in north channel, including the construction of a tunnel under this channel, and 320.7 cubic yards of concrete superstructure for 126 feet of canal wall adjoining the Poe lock on the west, these items not being covered by the original contract.

Under contract dated May 8, 1909, for the construction of the superstructure of the movable dam, Lawrence D. Weaning has partially placed his erection plant, and has delivered on the ground 469,722 pounds of metal.

The construction of a pair of mitering gates of the timber bowstring girder type for the new channel of the widened canal, with a clear channel way 108 feet wide and 25 feet deep, was commenced with a small force on July 12 and completed February 10. The two leaves were stepped in place on June 2 and 3. The cost of the gates, complete in place, including materials used but exclusive of abutments and sill, was approximately $15,000.

The timber superstructure of the first crib west of the Poe lock was removed to permit replacing with concrete, the cost being $900.11. In the extreme end of the center pier between the widened canal and new canal 11 piles were driven to anchor the crib, and these end pockets were then filled with concrete, 237 cubic yards being placed. The cost of the work was, for labor $648.76, and for materials and supplies $605.87, a total of $1,254.63.

End rest piers were built and pivot pier completed for the movable dam, 202 cubic yards of concrete being placed at a cost of $1,482.57. A small amount of filling and grading was done on "Bridge Island" near the site of the center pier of movable dam.

The tunnel extension required to pass electric wires under the widened canal and adjacent canal wall was completed by the construction of 54 feet of concrete-lined tunnel connecting with the steel-tube tunnel already in place, and completing the shaft. This work included the excavation of 191.3 cubic yards of rock and the placing of 98.5 cubic yards of concrete lining. The cost of the work was $4,046.17.

Along the back of the new concrete revetment walls of the widened canal 16,302 linear feet of duct has been laid in 4,046 linear feet of concrete envelope for placing underground all light, power, and telephone wires for the service of the canal and operation of the movable dam. The cost of this work was, for labor $1,731.41 and for materials and supplies $1,532.37, a total of $3,263.78. Back of the concrete walls 34 cast-iron snubbing buttons have been set in concrete at a cost of $1,869.36.

Along the river and slip face of the property recently acquired north of Water street the old docks have been repaired by redriving the old piles, driving some new ones, and building on them timber superstructures which may be filled and backfilled. In this work 88 new piles have been driven, 588 old piles redriven, 343,760 feet b. m. of timber framed and placed, 29,579 pounds of iron used, and 1,135 cubic yards of backfilling placed, the expenditure on the work being $13,699.36 during the year. The filling and grading of this property and the construction of concrete walks and iron fence have been nearly completed, the expenditures on such improvements during the year being $8,077.30.

Purchases of materials and equipment for canal improvement have included the following: 80 tons of manufactured steel for canal gate, 25,000 barrels of Portland cement, 650 tons of broken stone, 350 yards of sand, 2,840 linear feet of timber piling, 15,000 feet of oak timber, 9,250 linear feet of fiber conduit, 27 tons of manufactured steel, 740 linear feet of iron fence, 3 transformers, power, light, and telephone cables, and other miscellaneous supplies.

The construction of the new lock and canal is proceeding in accordance with plan 3 of the report of December 3, 1906, adopted by Congress in the river and harbor act approved March 2, 1907, providing for a lock 1,350 feet long between gates, giving a usable length of not less than 1,300 feet with a least depth of 24.5 feet below extreme low water, and a width of at least 80 feet, and a separate canal 260 to 300 feet in width.

Under contract dated August 21, 1909, John Marsch, contractor for the excavation of the lock pit, began work with one shovel on September 27, 1909, and added a second shovel on May 2, 1910. The average plant employed on the work consists of one compressor plant, 1 shovel, 2 channelers, 8 drills, 3 locomotives, 24 cars, with other auxiliary plant. The work accomplished during the year consists of 38,526 square feet of channeling, 132,514 cubic yards of excavation class A and 48,677 cubic yards class B. In connection with the work a short piece of retaining wall was built near the southwest cofferdam in lieu of excavating to a slope of one on one and a half.

The cofferdam surrounding the lock pit was completed; the work during the year included driving 87 pieces of steel sheet piling, 350 pieces of oak triple lap sheet piling, and 351 pieces of 6 by 12 inch fir sheet piling, all in lengths of 22 feet to 32 feet; the placing of 46 tie rods anchoring the southwest dam to the concrete canal wall, and 19 tie rods anchoring the southeast dam to the canal wall east of Poe lock, and the placing of 360 cubic yards of clay and 150 cubic yards of backfilling on the north and northwest dams to bring them to the required grade. A small amount of stockramming was done on the southwest dam in the vicinity of a slump that occurred in the lock-pit excavation. The total cost of the cofferdam to date is approximately $81,000.

The new northeast pier was extended 168 feet toward the lock site by placing two cribs and building superstructure. The filling of these two cribs was nearly completed. Another crib was built to extend the pier easterly, but the placing of it has been postponed. The dredging of the site was done under contract and the cribs were built and placed by hired labor. In this pier extension 39,013 cubic feet of timber and 67,925 pounds of iron have been used, and the cost of the work so far completed is, for labor $4,680.39, for material $8,606.40, a total of $13,286.79.

Purchases of materials and equipment for new lock and canal have included the following: 18,000 feet b. m. hemlock timber, 180,000 feet b. m. fir timber, 15,400 linear feet fiber conduit, and 200 tons of manufactured steel.

By hire of derrick boat by the working hour the deepening of the channel through Vidal shoals, forming a part of the upper entrance to new lock and canal, was completed to give a clear depth of 22 feet, below 601.5, for a width of 1,000 feet. The derrick boat worked 100¾ hours and removed an estimated amount of 395 cubic yards of gravel, bowlders, etc., from an area of 11,111 square yards.

Surveys for new lock and canal have included 234 soundings through overburden to determine elevation of rock surface over a part of the area included in the west canal. Surveys and plans were made for the construction of the west canal, including piers and side walls, and for the construction of a new headrace for the power plant, which may also serve as a forebay for filling the fourth lock, for which provision is made in the new canal. The studies for the masonry, gates, and machinery for the new lock were continued.

The operations of the Michigan Lake Superior Power Company under its permit were inspected. At the beginning of the fiscal year the company was using one-half of the ordinary flow through its canal. The mean water level of Lake Superior at the canal for the month of June, 1909, having reached the elevation 601.38, the company was permitted, by order of July 3, to use 75 per cent of the ordinary flow through its canal, and on July 27, the mean level having reached 601.5, the resumption of the use of the full ordinary flow was allowed. The mean water level for the month of January, 1910, having fallen below 601.5, the company was ordered, on February 14, to reduce the flow through its canal in accordance with the terms of its permit. The mean level for February showing continued decline, a further decrease in flow was ordered March 12, and the mean level for March having fallen below 601, all flow was stopped under order of April 18, except for the operation of one turbine to furnish current for the street railway of Sault Ste. Marie. On April 24 the company closed the canal in order to make repairs. These repairs were completed early in June, and the mean level for May having reached a stage of 601.27, the company was permitted to use 54 per cent of the ordinary flow, this amount being in use at the close of the year.

In accordance with the terms of the river and harbor act approved March 3, 1909, proceedings were taken for the acquisition of the lands and property north of the present St. Marys Falls ship canal to the International boundary line, by filing, on December 30, 1909, in the office of the register of deeds for Chippewa County, a description of the lands required. The purchase of property belonging to the Sault Ste. Marie Bridge Company for $12,615 was authorized by the Secretary of War May 17, 1910, with the provision that the United States is to construct an embankment for that portion of the railroad track now occupying the first fixed span of the bridge.

Daily readings of water gauges above and below the locks were made throughout the year, and the monthly means and differences are as follows:

[Elevation, in feet, above mean tide at New York, levels of 1877.]

Month.	Monthly means.		Mean difference.	Month.	Monthly means.		Mean difference.
	Above locks.	Below locks.			Above locks.	Below locks.	
1909.				**1910.**			
July	601.537	581.890	19.647	January	601.190	581.964	19.226
August	601.818	582.094	19.724	February	600.903	581.705	19.198
September	601.797	581.884	19.913	March	600.866	581.440	19.426
October	601.621	581.697	19.924	April	601.075	580.808	20.267
November	601.538	581.259	20.279	May	601.270	580.901	20.369
December	601.645	581.355	20.290	June	601.398	581.232	20.166

GENERAL IMPROVEMENT, INCLUDING CANAL WIDENING, ETC.

NEW LOCK AND CANAL.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$700,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

On past finished projects of 1856 to 1902, excluding $10 000 diverted from Great Lakes harbors appropriation of 1864, and including appropriation of June 11, 1896, $8,265.19 (claim) (as indicated in H. Doc. No. 421, 57th Cong., 2d sess.)	$7,387,822.19
March 3, 1905	420,000.00
June 30, 1906	100,000.00
March 4, 1907	250,000.00
March 4, 1909	225,000.00
June 25, 1910	25,000.00
	8,407,822.19

NEW LOCK AND CANAL.

March 2, 1907	1,200,000.00
March 4, 1909	425,000.00
June 25, 1910	600,000.00
	2,225,000.00
Aggregate of all appropriations	10,632,822.19

CONTRACTS IN FORCE.

CONTRACT DATED MARCH 23, 1908.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.

Amount and character of work: About $675,000; excavating, channeling, building cribs, filling cribs, mixing and placing concrete.

Price per unit: Soft material, 55 cents per cubic yard, bank measurement (full rate), and 27½ cents per cubic yard, bank measurement (half rate); rock, $1.30 per cubic yard, bank measurement (full rate), and 65 cents per cubic yard, bank measurement (half rate); channeling, 30 cents per square foot; framing, building, and placing cribs, 10 cents per cubic foot; filling, 30 cents per cubic yard; concreting, $4 and $5 per cubic yard.

Date of approval: April 2, 1908.

Date of beginning work: May 6, 1908.

Date of expiration: June 30, 1910.

EMERGENCY CONTRACT DATED APRIL 10, 1909.

Name of contractor: Minneapolis Steel and Machinery Company, Minneapolis, Minn.

Amount and character of work: $6,614.24; furnishing and delivering steel, etc., for canal gate.

Date of expiration: June 9, 1909.

Date of completion: October 29, 1909.

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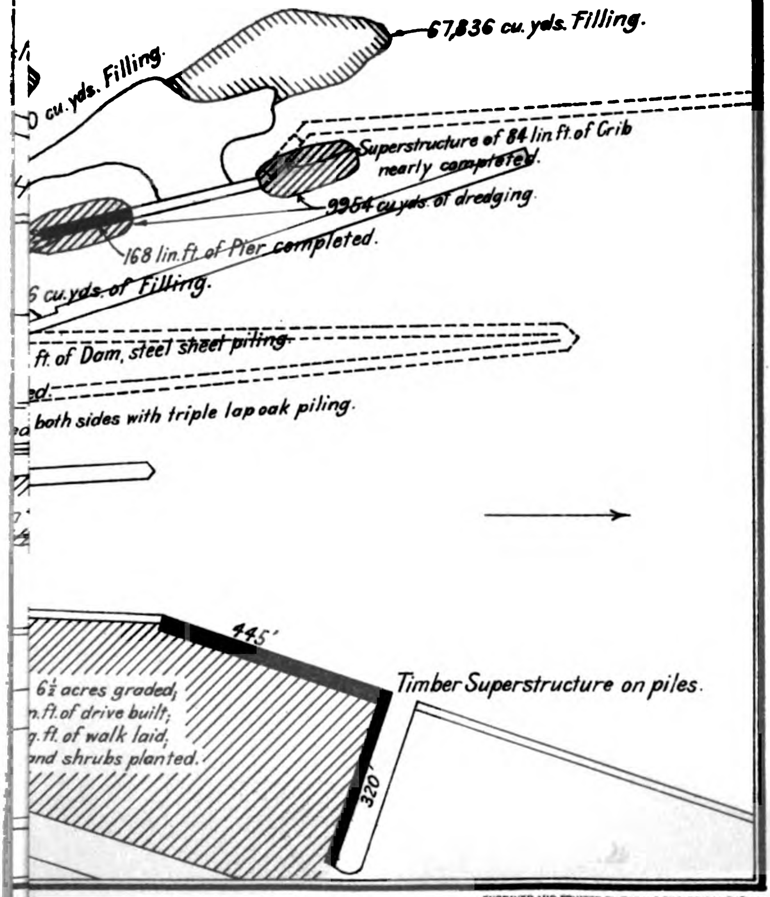
[a] Exclusive of the balance unexpended July 1, 1910.

Corps of Engineers, U.S. Army.

PROVEMENT OF
RIVER AT THE FALLS,
MICHIGAN.

MAP

ne during fiscal year 1909-10.


67,836 cu. yds. Filling.
0 cu. yds. Filling.
Superstructure of 84 lin. ft. of Crib
nearly completed.
9954 cu. yds. of dredging.
168 lin. ft. of Pier completed.
6 cu. yds. of Filling.
ft. of Dam, steel sheet piling.
ed:
both sides with triple lap oak piling.
445'
6½ acres graded;
n. ft. of drive built;
q. ft. of walk laid;
nd shrubs planted.
Timber Superstructure on piles.
320'

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

EMERGENCY CONTRACT DATED MAY 7, 1909.

Name of contractor: F. E. Carpenter Company, New York, N. Y.

Amount and character of work: $1,178.92; furnishing and delivering iron fence.

Price per unit: Lump sum, $1,178.92.

Date of expiration: June 21, 1909.

Date of completion: July 2, 1909.

CONTRACT DATED MAY 8, 1909.

Name of contractor: Lawrence D. Weaning, Cleveland, Ohio.

Amount and character of work: About $120,000; furnishing material and constructing superstructure, movable dam.

Price per unit: Steel, 4¼ cents; machinery, 8½ cents; castings and forgings, 7 cents; wire rope, 13 cents; phosphor bronze and brass, 28 cents per pound; electrical equipment, lump sum, $11,000.

Date of approval: May 14, 1909.

Date of beginning work: June 15, 1909.

Date of expiration: May 15, 1910.

EMERGENCY CONTRACT DATED MAY 11, 1909.

Name of contractor: Newbegin Lumber Company, Tacoma, Wash.

Amount and character of work: $2,658.82; furnishing and delivering fir timber.

Price per unit: $8.90 per thousand feet board measure.

Date of beginning work: June 21, 1909.

Date of expiration: July 21, 1909.

Date of completion: August 14, 1909.

EMERGENCY CONTRACT DATED MAY 21, 1909.

Name of contractor: J. Edward Ogden, New York, N. Y.

Amount and character of work: $1,159.23; furnishing and delivering drift bolts and steel bars.

Price per unit: Drift bolts, 1.453 cents and 1.501 cents; steel bars, 1.503 cents per pound.

Date of beginning work: June 19, 1909.

Date of expiration: July 8, 1909.

Date of completion: September 2, 1909.

EMERGENCY CONTRACT DATED JUNE 19, 1909.

Name of contractor: T. L. Durocher, Sault Ste. Marie, Mich.

Amount and character of work: $2,109.88, under these appropriations; time work by steam derrick boat, with diving plant, etc.

Price per unit: $6.75 per working hour.

Date of beginning work: June 16, 1909.

Date of expiration: About July 21, 1909.

Date of completion: October 25, 1909.

EMERGENCY CONTRACT DATED JULY 1, 1909.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.

Amount and character of work: $4,683.98; dredging.

Price per unit: 47 cents per cubic yard, bank measurement.

Date of beginning work: July 11, 1909.

Date of expiration: August 15, 1909.

Date of completion: July 27, 1909.

EMERGENCY CONTRACT DATED JULY 31, 1909.

Name of contractor: F. B. Spear & Sons, Marquette, Mich.

Amount and character of work: $5,693.75; furnishing and delivering Portland cement.

Price per unit: $1.13875 per barrel.

Date of beginning work: August 20, 1909.

Date of expiration: November 8, 1909.

Date of completion: September 15, 1909.

CONTRACT DATED AUGUST 21, 1909.

Name of contractor: John Marsch, Chicago, Ill.

Amount and character of work: About $350,000; excavating a lock pit.

Price per unit: Soft material, 47½ cents per cubic yard, bank measurement; rock, 93½ cents per cubic yard, bank measurement; channeling, 29½ cents per square foot.

Date of approval: August 26, 1909.

Date of beginning work: September 27, 1909.

Date of expiration: August 27, 1910.

EMERGENCY CONTRACT DATED OCTOBER 25, 1909.

Name of contractor: Alpha Portland Cement Company, Chicago, Ill.

Amount and character of work: $5,425; furnishing and delivering Portland cement.

Price per unit: $1.37 per barrel, including sacks, and $1.07 per barrel, excluding sacks.

Date of beginning work: November 14, 1909.

Date of expiration: December 24, 1909.

Date of completion: November 23, 1909.

EMERGENCY CONTRACT DATED NOVEMBER 9, 1909.

Name of contractor: Alpha Portland Cement Company, Chicago, Ill.

Amount and character of work: $5,183.35; furnishing and delivering Portland cement.

Price per unit: $1.37 per barrel, including sacks, and $1.07 per barrel, excluding sacks.

Date of beginning work: November 29, 1909.

Date of expiration: January 8, 1910.

Date of completion: December 3, 1909.

EMERGENCY CONTRACT DATED DECEMBER 21, 1909.

Name of contractor: Lehigh Portland Cement Company, Cleveland, Ohio.

Amount and character of work: $5,905.94; furnishing and delivering Portland cement.

Price per unit: $1.47 per barrel, including sacks, and $1.17 per barrel, excluding sacks.

Date of beginning work: January 10, 1910.

Date of expiration: February 19, 1910.

Date of completion: March 11, 1910.

EMERGENCY CONTRACT DATED DECEMBER 24. 1909.

Name of contractor: Minneapolis Steel and Machinery Company, Minneapolis, Minn.

Amount and character of work: $1,247.94; furnishing and delivering rods, clevises, etc.

Price per unit: Tie-rods and washers, 3½ cents per pound; nuts, 6 cents per pound; clevises, $1.60 each; cotter pins, 35 cents each.

Date of beginning work: January 3, 1910.

Date of expiration: February 22, 1910.

Date of completion: March 5, 1910.

EMERGENCY CONTRACT DATED FEBRUARY 17, 1910.

Name of contractor: Lehigh Portland Cement Company, Cleveland, Ohio.

Amount and character of work: $4,817.32; furnishing and delivering Portland cement.

Price per unit: $1.49 per barrel, including sacks, and $1.19 per barrel, excluding sacks.

Date of beginning work: March 9, 1910.

Date of expiration: April 8, 1910.

Date of completion: April 8, 1910.

EMERGENCY CONTRACT DATED MARCH 8, 1910.

Name of contractor: W. B. Earle, Sault Ste. Marie, Mich.
Amount and character of work: About $815 under this appropriation; furnishing and delivering oak timber.
Price per unit: $45 and $65 per 1,000 feet b. m.
Date of beginning work: March 28, 1910.
Date of expiration: June 16, 1910.

EMERGENCY CONTRACT DATED APRIL 14, 1910.

Name of contractor: Northern Electric Company, Sault Ste. Marie, Mich.
Amount and character of work: $1,337; furnishing and delivering transformers and oil switch.
Price per unit: Transformers, $435 each; oil switch, $32.
Date of expiration: May 21, 1910.

EMERGENCY CONTRACT DATED APRIL 22, 1910.

Name of contractor: Jones & Laughlin Steel Company, Pittsburg, Pa.
Amount and character of work: About $1,050; furnishing and delivering twisted steel bars.
Price per unit: $1.70¼ per hundredweight.
Date of beginning work: June 21, 1910.
Date of expiration: July 21, 1910.
Date of completion: June 18, 1910.

EMERGENCY CONTRACT DATED APRIL 25, 1910.

Name of contractor: Pittsburgh Screw and Bolt Company, Pittsburg, Pa.
Amount and character of work: About $6,900; furnishing and delivering bolts, rods, etc.
Price per unit: Tie rods, etc., $2.35 per hundredweight; drift bolts, $1.69 per hundredweight; plate washers, $2.60 per hundredweight; sleeve nuts, 60 cents each; turn-buckles, 65 cents each; hexagon nuts, 3½ cents per pound.
Date of beginning work: June 24, 1910.
Date of expiration: July 24, 1910.

CONTRACT DATED APRIL 26, 1910.

Name of contractor: Emery D. Weimer, Ludington, Mich.
Amount and character of work: About $32,000; furnishing and delivering hemlock timber.
Price per unit: $18.94 per thousand feet b. m.
Date of approval: May 11, 1910.
Date of beginning work: August 11, 1910.
Date of expiration: October 10, 1910.

EMERGENCY CONTRACT DATED APRIL 26, 1910.

Name of contractor: Waterbury Company, New York, N. Y.
Amount and character of work: About $3,450; furnishing and delivering electric power cable and wire.
Price per unit: $1.46, 48 cents, and 16.2 cents per foot.
Date of expiration: June 10, 1910.

EMERGENCY CONTRACT DATED APRIL 26, 1910.

Name of contractor: Standard Underground Cable Company, Pittsburg, Pa.
Amount and character of work: $1,477.09; furnishing and delivering light and telephone cables.
Price per unit: 49.1 cents, 19.6 cents, 11.2 cents, 11.1 cents, 9.3 cents, and 6.7 cents per foot.
Date of expiration: May 24, 1910.
Date of completion: June 8, 1910.

CONTRACT DATED MAY 3, 1910.

Name of contractor: White Star Lumber Company, Elma, Wash.
Amount and character of work: About $11,200; furnishing and delivering fir timber.
Price per unit: $11.25 per thousand feet b. m.
Date of approval: May 27, 1910.
Date of beginning work: July 28, 1910.
Date of expiration: October 26, 1910.

EMERGENCY CONTRACT DATED MAY 16, 1910.

Name of contractor: G. Elias & Brother, Buffalo, N. Y.
Amount and character of work: About $5,500; furnishing and delivering southern pine timber.
Price per unit: $39.75 and $85 per thousand feet b. m.
Date of expiration: September 13, 1910.

N N 3.

OPERATING AND CARE OF ST. MARYS FALLS CANAL.

During the fiscal year the canal was open to navigation 221 days, the closed period of 144 days being from December 12, 1909, to May 4, 1910, inclusive. During the open period there passed through the canal 28,951,144 tons of freight, a decrease of 3,806,342 tons, compared with the fiscal year 1909.

The total delays that occurred in locking vessels amounted to 306 hours and 21 minutes, of which 301 hours and 36 minutes occurred at the Poe lock and 4 hours and 45 minutes at the Weitzel lock.

The south leaf of the upper operating gate, Poe lock, was wrecked by the steamer *Isaac L. Elwood*. Other accidents to property were minor ones, and those to persons, with two exceptions, were not serious.

During the closed season repairs were made to both locks.

The complete statistics of lake commerce passing through the American and Canadian canals during the season of 1909, compiled from the official records of the St. Marys Falls Canal, are appended.

The estimated amount of funds required for the year ending June 30, 1911, is $145,000, to be expended approximately as follows: For pay rolls, $84,000; for general repairs, $10,000; for general supplies, $5,000; for electric lighting of buildings, locks, and grounds, $3,000; for general contingencies, including office expenses, $3,000; for replacing the old timber cribs of the south canal wall with concrete, $40,000. These timber cribs were built twenty-seven years ago, when the canal was widened during the construction of the Weitzel lock. They have been repaired above the water surface from time to time, but the rock foundation on which they are supported is at numerous localities disintegrating from the action of frost, and it is proposed to face this rock with concrete, on which will be placed a concrete superstructure similar to the north wall of the canal recently completed. The estimated cost of the work is $120,000, and it is proposed to complete it during three winter seasons.

ORGANIZATION.

The regular force of 93 persons, viz, 1 general superintendent, 1 superintendent, 3 clerks, 1 chief engineman, 3 assistant superintendents, 1 overseer, 6 lockmasters, 6 enginemen, 7 watchmen, 1 storekeeper, 3 recorders, 3 messengers, 9 first-grade lockmen, 9 second-grade lockmen, 15 third-grade lockmen, and 24 linemen were severally employed from 9 to 12 months in locking boats, office work, and care of property. A small force of men, varying from 5 to 35, was employed 10 months in repairing piers, masonry, and gates, and in grading and care of grounds. A carpenter, painter, mason, blacksmith, and calker were occasionally employed.

REPAIRS.

The ordinary maintenance and fitting-out repairs included the repair and renewal of all damaged, worn-out, or broken parts of operating machinery, replacing broken masonry with concrete, refilling piers, the painting of gates, snubbing posts and electric-light poles, and testing of all machinery.

Special repair to south leaf of upper operating gate, Poe lock, wrecked by the steamer *Isaac L. Elwood* on November 10, 1909, was made by the American Ship Building Company, for the Pittsburgh Steamship Company, owners of the steamer *Elwood*. Work was begun February 7 and completed May 4. The gate was torn down and such parts as required it were shipped to Superior, Wis., to be rerolled, replaced, or repaired. In rebuilding this gate two sluice valves were put in. On June 1, with the aid of the Canadian canal pontoon, this gate was stepped into place , and will be used as a guard gate.

In the south leaf of the upper guard gate, Poe lock, which has replaced the gate wrecked by the steamer *Isaac L. Elwood*, 8 holes 7 inches in diameter and 4 holes $2\frac{3}{16}$ inches in diameter have been cut, above air chamber, to adapt this gate for use as a service gate.

The iron supports and I beams for footbridges of the intermediate gates, Poe lock, had become badly rusted because of having been filled in with timber. The bridges were renewed, the iron supports being incased in concrete and oak timbers being used to support the flooring.

The exteriors of Poe lock gates were thoroughly cleaned by brushing and scraping, and all rust spots touched up with red lead prior to general painting.

Gate fasteners have been placed on intermediate gates, in order to securely hold them in gate recess when open.

In July the sill of upper operating gate, Poe lock, became loose, and the lock was pumped out and temporary repairs were made as follows: The greater portion of the sill of north leaf and some of the masonry to which it was bolted, and which had cracked, was removed. The holes for vertical bolts, formerly extending into the second course, were then drilled down into the fourth course, and the sill replaced and secured with the longer bolts. As the face of the masonry in which these bolts were fastened was not sound in all cases, additional short vertical bolts were placed through the sill and fastened by horizontal bolts passing well into the second course. The masonry back of the sill that had spalled off was replaced with concrete.

Permanent repair to miter wall, Poe lock: Through the middle of the wall on line with the vertical bolting a crack developed some years ago, which has extended to bottom of wall. As the face of the wall was cracked, loosening the bolts holding down the miter sill, it was considered necessary to replace the injured portion of the wall, i. e., the upstream half. About 253 cubic yards of masonry was drilled, blasted, hoisted to lock wall and removed; 257 cubic yards of reenforced concrete was deposited in place, and repairs completed by setting a new timber sill in cast-steel support.

Repairs to culverts consisted in rethreading 100 rods that had been found loose, and placing new turn-buckles thereon.

In Weitzel lock, 77 culvert rods which had become loose were repaired.

The upper service gates were trued up by tightening the horizontal and diagonal rods. The timber for rebuilding these gates has been received, and it is proposed to complete the repairs this season.

An electric-light pole was repaired by constructing and erecting an experimental pole made of reenforced concrete.

Under emergency contract dated June 19, 1909, for hire of derrick boat, complete, at $6.75 per working hour, T. L. Durocher, contractor, was employed 45 hours and 30 minutes, and removed 160 cubic yards of loose sand, rock, and sunken wood from east approach to Poe lock.

The same contractor was also employed in open market, at contract rates, and worked 61 hours and 30 minutes during December, and removed 145 cubic yards of loose stone and sand from catch basin at canal headgates; and also 27 hours and 45 minutes in April, 1910, and removed 90 cubic yards of broken rock and sand from east approach to Poe lock.

Under emergency contract dated March 17, 1910, G. W. Gates & Co., of Portland, Oreg., delivered 51,571 feet b. m. of fir timber f. o. b. cars on Pacific coast, at $33 per thousand feet b. m., for rebuilding Weitzel lock gates, completing the contract.

Under emergency contract dated March 3, 1910, W. B. Earle, of Sault Ste. Marie, Mich., delivered 9,613 feet b. m. of oak timber, at $45 per thousand feet b. m., for repairs to Poe lock fenders and gate cushions.

At the close of navigation the canal headgates were closed December 18, the water drained off to lower level, the locks unwatered, and the machinery taken apart and laid up for the winter. The leakage in Weitzel lock was pumped by electric power and from the Poe lock and canal by steam power up to March 5, and from March 6 to May 4 by electric power. On the latter date the contractor for canal widening removed his plant from the canal, permitting water to be admitted.

ACCIDENTS.

Fred D. Cogswell, watchman on steamer *J. T. Hutchinson*, was crushed to death between southwest pier and steamer while attempting to make a landing from a line.

Andrew Kaleskoy, a sailor on barge *B. L. Pennington*, fell overboard when vessel was making landing at southeast pier and was drowned.

There were 38 minor accidents that resulted in pulling out 11 snubbing posts, breaking 18 pieces from lock masonry, parting gate cable, breaking concrete base of snubbing button, bruising 3 timbers in canal piers, bending 2 vertical straps on Weitzel lock gates, damaging gate rail and fender, and breaking plank in southwest operating gate, Weitzel lock.

There were two minor collisions between vessels while passing through the canal, and three vessels were slightly damaged by striking lock fenders, piers, etc.

The south leaf of upper operating gate, Poe lock, was rammed by the steamer *Isaac L. Elwood* on November 10. A downbound lockage was in progress and when 1,200 feet west of the gate, the captain of the *Elwood* signaled to back, but the man at the engine became confused, and, in response to repeated signals to back up, worked the engine ahead and struck the gate while going perhaps 4 or 5 miles per hour. With the aid of the Canadian canal pontoon the wrecked gate was removed and replaced with the south leaf of upper guard gate.

The steamer *Culligan*, upbound in Weitzel lock, when about to leave, backed her wheel instead of going ahead, and struck and damaged railing of lower gate with her fantail when about stopped. The incident was due to confusion of signals.

DELAYS.

Poe lock.—The delays to navigation in the Poe lock amounted to 301 hours and 36 minutes, as follows: 184 hours and 15 minutes due to steamer *Isaac L. Elwood* wrecking south leaf of upper operating gate; 69 hours and 8 minutes due to pumping out lock and making temporary repairs to upper miter sill; 43 hours and 51 minutes due to vessels being overloaded; 2 hours and 39 minutes due to removing obstructions from miter sill; 38 minutes due to false placement of boats; 20 minutes due to grounding of steamer below lock; 25 minutes due to running fire hose across canal; and 20 minutes due to unloading pile driver on canal pier.

Weitzel lock.—In this lock the delays amounted to 4 hours and 45 minutes, as follows: 2 hours due to grounding of upbound steamer; 1 hour and 25 minutes due to false placement of boat; 1 hour due to fouling of dredge spud on lower guard gate sill; and 20 minutes due to fouling of towline.

The canal was obstructed for 2 hours and 51 minutes, of which 51 minutes was due to binding of railroad swing bridge against south abutment, and 2 hours to moving warehouse from site of new lock and canal across north pier to 3 scows, on which it was transported to lower level.

Five vessels were backed out of canal drawing more water than available for Poe lock. They crossed the river and passed down through the Canadian canal.

The actual expenditures during the fiscal year were $103,329.90, in addition to $389.72 paid by Treasury Department, making the total expenditures $103,719.62; from this amount $623.44 (proceeds of sale of condemned property) have been deducted, leaving the net expenditures $103,096.18.

Summary of expenditures for operating and care of St. Marys Falls Canal, Michigan, for the fiscal year ending June 30, 1910.

Pay rolls	$85, 943. 02
Repair material, etc. (including $279.72 paid by Treasury Department for freight transportation)	7, 283. 36
General supplies	4, 558. 94
Electric lighting	3, 080. 15
Contingencies (including $110 transferred by Treasury Department to appropriation for survey of northern and northwestern lakes for inset maps)	2, 854. 15
	103, 719. 62
Deduct amount received from sale of condemned property	623. 44
Net expenditures during fiscal year	103, 096. 18

Statement of expenditures for operating and care of St. Marys Falls Canal, Michigan.

1882	$27, 545. 86	1898	$56. 674. 16
1883	36, 335. 77	1899	89, 000. 88
1884	29, 486. 29	1900	80, 309. 27
1885	29, 064. 52	1901	75, 559. 34
1886	26, 089. 12	1902	88. 595. 53
1887	21, 832. 55	1903	82, 946. 09
1888	30, 003. 46	1904	93, 078. 07
1889	30, 603. 61	1905	85, 422. 92
1890	36, 723. 27	1906	89. 670. 02
1891	44, 960. 79	1907	89, 827. 26
1892	61, 241. 09	1908	109, 918. 71
1893	41, 828. 07	1909	106, 514. 26
1894	55, 132. 21	1910	103, 096. 18
1895	50, 535. 61		
1896	59, 629. 08	Total	1, 810, 831. 14
1897	79, 207. 15		

The above amounts represent the actual expenditures and in no case include the outstanding liabilities, which for the fiscal year 1910 amount to $8,175.19, in addition to $2,095.34 covered by existing contract.

CONTRACTS IN FORCE.

EMERGENCY CONTRACT, DATED JUNE 19, 1909.

Name of contractor: T. L. Durocher, Sault Ste. Marie, Mich.

Amount and character of work: $308.47, under this appropriation; time work by steam derrick boat, with diving plant, etc.

Price per unit: $6.75 per working hour.

Date of beginning work: June 16, 1909.

Date of expiration: About July 21, 1909.

Date of completion: October 4, 1909, under this appropriation.

EMERGENCY CONTRACT, DATED MARCH 8, 1910.

Name of contractor: W. B. Earle, Sault Ste. Marie, Mich.

Amount and character of work: About $432, under this appropriation; furnishing and delivering oak timber.

Price per unit: $45 per thousand feet b. m.

Date of beginning work: March 28, 1910.

Date of expiration: June 16, 1910.

Date of completion: April 15, 1910, under this appropriation.

EMERGENCY CONTRACT, DATED MARCH 17, 1910.

Name of contractor: G. W. Gates & Co., of Portland, Oreg.

Amount and character of work: $1,701.84; furnishing and delivering fir timber.

Price per unit: $33 per thousand feet b. m.

Date of beginning work: April 16, 1910.

Date of expiration: May 16, 1910.

Date of completion: April 21, 1910.

EMERGENCY CONTRACT, DATED JUNE 21, 1910.

Name of contractor: Minneapolis Steel and Machinery Company, Minneapolis, Minn.

Amount and character of work: $2,095.34; furnishing and delivering iron and steel.

Date of beginning work: Indefinite.

Date of expiration: August 20, 1910.

COMMERCIAL STATISTICS.

Statistical report of lake commerce through canals at Sault Ste. Marie, Michigan and Ontario, for the fiscal year ending June 30, 1910.

Item.	United States canal.	Canadian canal.	Total.
Vessel passages ......number..	13,093	8,346	21,439
Lockages ......do....	8,801	6,062	14,863
Net tonnage:			
Registered	29,678,738	24,112,674	53,791,412
Freight	28,951,144	37,153,709	66,104,853
Passengers ......number..	27,736	34,607	62,343
Coal:			
Hard ......short tons..	1,022,303	584,357	1,606,660
Soft ......do....	6,702,255	3,282,278	9,984,533
Flour ......barrels..	4,584,226	2,903,078	7,487,304
Wheat ......bushels..	34,557,845	83,289,350	117,847,195
Grain (other than wheat) ......do....	19,413,081	33,928,253	53,341,334
Manufactured and pig iron ......short tons..	352,662	209,745	562,407
Salt ......barrels..	420,471	263,576	684,047
Copper ......short tons..	109,747	22,344	132,091
Iron ore ......do....	17,275,084	28,774,748	46,049,832
Lumber ......M feet b m...	535,806	56,022	591,828
Building stone ......short tons..	1,404	....	1,404
General merchandise ......do....	590,722	660,730	1,251,452

NOTE.—The United States canal was open to navigation 221 days during the fiscal year. The Canadian canal was open to navigation 249 days during the fiscal year.

Comparative statement of commerce through St. Marys Falls Canal, Michigan, during the fiscal years 1909 and 1910.

Items.	Fiscal year—		Increase.	Decrease.
	1909.	1910.		
Vessels, passages ......number..	11,164	13,093	1,929	....
Lockages ......do....	7,671	8,801	1,130	....
Net tonnage:				
Registered	25,481,838	29,678,738	4,196,900	....
Freight	32,757,486	28,951,144	....	3,806,342
Passengers ......number..	23,101	27,736	4,635	....
Coal ......short tons..	8,020,649	7,724,558	....	296,091
Flour ......barrels..	3,823,434	4,584,226	760,792	....
Wheat ......bushels..	46,222,202	34,557,845	....	11,664,357
Grain (other than wheat) ......do....	22,991,463	19,413,081	....	3,578,382
Manufactured and pig iron ......short tons..	206,494	352,662	146,168	....
Salt ......barrels..	486,777	420,471	....	66,306
Copper ......short tons..	101,063	109,747	8,684	....
Iron ore ......do....	20,716,585	17,275,084	....	3,441,501
Lumber ......M ft. b. m..	459,751	535,806	76,055	....
Building stone ......short tons..	1,899	1,404	....	495
General merchandise ......do....	567,801	590,722	22,921	....

Summary of traffic through St. Marys Falls Canal, Michigan, for the fiscal year ending June 30, 1910.

Number of vessels through Weitzel Lock		4,826
Number of vessels through Poe Lock		8,267
		13,093
Number of lockages through Weitzel Lock		3,715
Number of lockages through Poe Lock		5,086
		8,801
Total registered tonnage		29,678,738
Total freight tonnage		28,951,144

Total time spent in making lockages. 4,307 hours and 23 minutes.

Average time spent in making lockages, 29 minutes and 22 seconds.

Total time spent by vessels in passing locks, 6,273 hours and 28 minutes.

Average time spent by vessels in passing locks, 28 minutes and 45 seconds.

Cost per lockage		$11.59
Cost per passage		$7.79
Cost per registered ton	mills	3.44
Cost per freight ton	do	3.52

The Weitzel Lock was open to navigation 179 days, from July 1 to October 31, 1909, and from May 6 to June 30, 1910.

The time for the Poe Lock was 221 days, from July 1 to December 11, 1909, and from May 5 to June 30, 1910.

STATISTICS OF LAKE COMMERCE PASSING THROUGH THE AMERICAN AND CANADIAN CANALS AT SAULT STE. MARIE, MICHIGAN AND ONTARIO DURING THE SEASON OF 1909.

[Compiled from Official Records at St. Marys Falls Canal, Michigan.]

SOURCES OF INFORMATION FOR TRAFFIC DATA AND VALUATIONS.

Freight tonnage and passengers.—The freight unit used and designated as a "net ton" means in every instance a ton of 2,000 pounds. The data relative to freight and passengers were compiled from reports made by vessel masters when passing through the American and Canadian canals. As a daily exchange of these reports is made with the Canadian Canal, both offices have record of the entire lake traffic to and from Lake Superior.

Registered tonnage.—The registered tonnage, as given, was obtained from vessel papers and blue books.

Freight rates.—These were compiled from quotations published in the Marine Review, and from information obtained from shippers, owners, and carriers of the several classes of freight. The freight rates given are for lake transportation, and include cost of loading and unloading.

Freight valuations.—The unit values used for the various items of freight were derived by taking the mean, for the season, of each monthly average as obtained from daily or weekly prices current, and from quotations by the principal shippers, owners, and carriers. To quotations given at point of shipment, freight rates are added to lake ports of destination.

The compilation was done by the clerical force in the United States canal office at Sault Ste. Marie, Mich., under the supervision of General Superintendent L. C. Sabin.

American and Canadian canals.—The total freight traffic of 57,895,149 net tons for the season of 1909, when compared with season of 1908, shows an increase of 40 per cent, or 16,504,592 tons, and the net registered tonnage of 46,751,717 shows an increase of 50 per cent, or 15,659,987 tons.

All the items of freight show an increase when compared with the season of 1908.

The total number of passengers was 59,948, an increase of 6,661.

The passages through both canals numbered 19,204, showing a gain of 4,023, or 26 per cent.

The total lockages numbered 13,571, a gain of 2,886, or 27 per cent.

The season of navigation continued for a period of 7 months and 27 days, during which time the average monthly freight traffic was 7,328,500 net tons, and 5,917,939 tons net register.

The mean depth of water in entrance channels and through the canals and locks permitted a safe draft of 18.9 feet.

American canal.—The traffic through the American canal was 52 per cent of the total freight, 62 per cent of the total net registered tonnage, and 46 per cent of the total number of passengers carried, the amounts being 30,132,374 tons of freight, 28,939,463 tons register, and 27,736 passengers. Compared with the season of 1908 there was an increase of 1,475,077 tons of freight, or 5 per cent; 7,451,964 tons register, or 35 per cent; and 4,657 passengers, or 20 per cent.

The American canal opened April 20 and closed December 11, 1909, making the length of its season 236 days.

Canadian canal.—The traffic through the Canadian canal was 48 per cent of the total freight, 38 per cent of the total registered tonnage, and 54 per cent of the passengers carried, the amounts being 27,762,775 tons of freight, 17,812,254 tons register, and 32,212 passengers. Compared with the season of 1908, there was an increase of 15,029,515 tons of freight, or 118 per cent; 8,208,023 tons register, or 85 per cent; and 2,004 passengers, or 7 per cent.

The Canadian canal was opened April 21 and closed December 16, 1909, making the length of its season 240 days.

GENERAL SUMMARY.

[For American and Canadian canals together.]

Total freight carried	tons	57,895,149
Total tons net register		46,751,717
Total mile-tons		46,812,929,345
Total valuation placed on freight carried		$626,104,173
Total amount paid for freight carried		$36,291,948
Total number of registered vessels using canals		870
Total number of passages by unregistered crafts carrying freight		242
Total valuation placed on registered vessels		$126,899,000
Total number of passengers transported		59,948
Average distance freight was carried	miles	809
Average cost per ton for freight transportation		$0.63
Average cost per mile per ton	mills	.78
Average value per ton of freight carried		$10.81
Time American canal was operated	days	236
Time Canadian canal was operated	do	240
Freight carried by—		
Registered vessels	tons	57,871,097
Unregistered vessels	do	24,052
American vessels	per cent	94
Canadian vessels	do	6
Passengers carried by—		
American vessels	do	39
Canadian vessels	do	61
Average number of vessels passing per day—		
Through Poe lock		35
Weitzel lock		22
Canadian lock		27
Poe, Weitzel, and Canadian locks		80

East and west bound commerce passing both American and Canadian canals at Sault Ste. Marie, Mich. and Ontario, for the season of 1909.

Articles.	United States canal.	Canadian canal.	Total.	Total short tons.
EASTBOUND.				
Copper..........short tons..	118,889	8,323	127,212	127,212
Grain..........bushels..	17,984,646	28,528,222	46,512,868	1,032,258
Building stone..........short tons..	1,784	....	1,784	1,784
Flour..........barrels..	4,580,473	2,508,392	7,088,865	708,887
Iron ore..........short tons..	18,866,499	21,128,194	39,994,693	39,994,693
Pig iron..........short tons..	36,240	4,414	40,654	40,654
Lumber..........M feet b. m..	517,694	34,686	552,380	912,821
Wheat..........bushels..	38,438,716	74,814,845	113,253,561	3,397,608
General merchandise..........short tons..	98,099	65,060	163,159	163,159
Passengers..........number..	15,126	14,751	29,877	....
WESTBOUND.				
Coal, hard..........short tons..	1,060,753	351,634	1,412,387	1,412,387
Coal, soft..........short tons..	6,150,540	2,377,099	8,527,639	8,527,639
Flour..........barrels..	360	4,950	5,310	531
Grain..........bushels..	5,750	833	6,583	106
Manufactured iron..........short tons..	327,219	154,408	481,627	481,627
Iron ore..........short tons..	....	20,285	20,285	20,285
Salt..........barrels..	449,977	201,114	651,091	96,303
General merchandise..........short tons..	497,465	479,720	977,185	977,185
Passengers..........number..	12,610	17,461	30,071	....
Vessel passages..........number..	12,803	6,401	19,204	....
Registered tonnage..........short tons..	28,939,463	17,812,254	46,751,717	....
Freight:				
Eastbound..........short tons..	22,028,768	24,350,318	46,379,086	46,379,086
Westbound..........short tons..	8,103,606	3,412,457	11,516,063	11,516,063
Total freight..........	30,132,374	27,762,775	57,895,149	57,895,149

Monthly registered and freight tonnage, season 1909.

Month.	Net registered tonnage of vessels.			Freight carried, short tons.		
	Eastbound.	Westbound.	Total.	Eastbound.	Westbound.	Total.
April..........	28,856	229,729	258,585	49,047	172,564	221,611
May..........	2,002,069	2,079,877	4,081,946	3,796,386	1,166,965	4,963,351
June..........	2,820,778	2,777,398	5,598,176	5,489,356	1,443,049	6,932,405
July..........	3,490,814	3,652,027	7,142,841	6,879,210	1,827,456	8,706,666
August..........	3,562,431	3,508,870	7,071,301	7,127,910	1,860,313	8,988,223
September..........	3,690,326	3,745,443	7,435,769	7,615,416	1,611,776	9,227,192
October..........	3,760,172	3,839,276	7,599,448	7,649,455	1,477,785	9,127,240
November..........	3,268,257	3,241,016	6,509,273	6,413,327	1,523,785	7,937,112
December..........	739,792	314,586	1,054,378	1,358,979	432,370	1,791,349
Total..........	23,363,495	23,388,222	46,751,717	46,379,086	11,516,063	57,895,149

INTERLAKE TRAFFIC.

Freight between Lake Superior and each of the other lakes.

[Classified with reference to American and Canadian vessels and ports.]

Freight carried by—	Ports.		Eastbound from Lake Superior to—				Total.
	From—	To—	Lake Michigan.	Lake Huron.	Lake Erie.	Lake Ontario.	
American vessels.	American.	American.	6,790,045	183,304	36,440,647	33,926	43,447,922
Do..........	...do......	Canadian.	....	12,425	....	68,063	80,488
Do..........	Canadian.	American.	14,219	78,657	513,683	2,435	608,994
Canadian vessels..	...do......	Canadian.	....	1,222,251	64,009	556,729	1,842,989
Do..........	...do......	American.	8,034	10,328	123,755	....	142,117
Do..........	American.	Canadian.	....	175,335	....	81,241	256,576
Total eastbound.	....	....	6,812,298	1,682,300	37,142,094	742,394	46,379,086

Freight between Lake Superior and each of the other lakes—Continued.

Freight carried by—	Ports.		Westbound to Lake Superior from—				Total.
	From—	To—	Lake Michigan.	Lake Huron.	Lake Erie.	Lake Ontario.	
American vessels.	American.	American.	159,573	79,374	8,804,270	5,297	9,048,514
Do	...do	Canadian.	12,259	4,549	1,048,668	2,342	1,067,818
Do	Canadian.	American.	....	100	....	11,265	11,365
Canadian vessels.	...do	Canadian.	....	236,283	33,554	278,573	548,410
Do	...do	American.	....	22,010	....	....	22,010
Do	American.	Canadian.	33,068	....	779,406	5,472	817,946
Total westbound.	....	....	204,900	342,316	10,665,898	302,949	11,516,063
Grand total.	....	....	7,017,198	2,024,616	47,807,992	1,045,343	57,895,149

AMOUNT PAID FOR CARRYING FREIGHT.

Transportation charges, including loading and unloading, on freight passing through canals at Sault Ste. Marie, Mich., and Ontario, for the season of 1909.

Article.		Quantity.	Rate per unit.	Amount.
Coal	short tons	9,940,026	$0.31	$3,081,408.06
Flour	barrels	7,094,175	.23	1,631,660.25
Wheat	bushels	113,253,561	.02	2,265,071.22
Grain, other than wheat	do	46,519,451	.02	930,389.02
Manufactured iron	short tons	481,627	1.80	866,928.60
Pig iron	do	40,654	1.50	60,981.00
Salt	barrels	651,091	.15	97,663.65
Copper	short tons	127,212	1.10	139,933.20
Iron ore	do	40,014,978	.59	23,608,837.02
Lumber	M feet b. m.	552,380	2.40	1,325,712.00
Silver ore	short tons	....	....	....
Building stone	do	1,784	1.50	2,676.00
General merchandise	do	1,140,344	2.00	2,280,688.00
Total		....	....	36,291,948.02

VALUE OF TOTAL FREIGHT CARRIED.

Estimated value of total freight passing the canals at Sault Ste. Marie, Mich., and Ontario, for the season of 1909.

Items.		Quantity.	Price per unit.	Valuation.	Per cent of total value.
Coal, anthracite	short tons	1,412,387	$5.47	$7,725,757	4.64
Coal, bituminous	do	8,527,639	2.50	21,319,098	
Flour	barrels	7,094,175	5.40	38,308,545	31.60
Wheat	bushels	113,253,561	1.06	120,048,775	
Grain, other than wheat	do	46,519,451	.85	39,541,533	
Iron ore	short tons	40,014,978	3.65	146,054,670	23.33
Manufactured iron	do	481,627	75.00	36,122,025	5.89
Pig iron	do	40,654	17.40	707,380	
Copper (refined and concentrates)	do	127,212	256.00	32,566,272	5.20
Lumber	M feet b. m.	552,380	22.00	12,152,360	1.94
Salt	barrels	651,091	.75	488,318	27.40
Silver ore	short tons	....	....	....	
Building stone	do	1,784	10.00	17,840	
General merchandise	do	1,140,344	150.00	171,051,600	
Total		....	....	626,104,173	100.00

The value of grain, other than wheat, as given in the above table, is computed as follows:

Articles.	Bushels.	Price per unit.	Total value.
Rye	423,730	$0.691	$292,785
Oats	20,003,699	.445	8,901,646
Corn	1,360,569	.658	895,254
Barley	11,657,133	.566	6,597,937
Flax	13,074,320	1.748	22,853,911
Total	46,519,451	[a].85	39,541,533

[a] Average.

VESSEL DIMENSIONS.

Classification of registered vessels as to length and beam over all.

[Nonfreight carriers: Tugs, yachts, etc.]

Length.	Beam.	Number of vessels.										
		1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.
Feet.	*Feet.*											
30 to 100	8 to 29	56	38	69	45	62	83	58	67	61	61	53
100 to 200	12 to 32	6	4	7	5	8	22	4	14	18	25	31
200 to 300	26 to 40											3
379	45	2	2			1	1	1	1	1	1	1

[Freight carriers.]

Length.	Beam.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.
30 to 100	8 to 28	53	44	16	39	20	6	26	13	10	10	8
100 to 200	21 to 39	283	316	275	243	219	183	194	170	150	113	121
200 to 300	32 to 43	267	285	303	337	314	291	293	258	247	223	224
300 to 400	38 to 50	124	134	152	179	174	181	183	171	177	136	161
400 to 500	45 to 53	41	56	71	87	97	118	128	128	141	137	157
500 to 600	52 to 60						1	23	57	70	96	106
600 and over	60 to 60-2 inches									4	4	5
Total		832	879	893	935	895	886	910	879	879	806	870

VESSEL CLASSIFICATION, VALUATION, ETC.

Classification of American and Canadian vessels, showing valuation and registered tonnage and the freight and passengers carried through the canals at Sault Ste. Marie, Michigan and Ontario, during the season of 1909.

Class.	No.	Valuation.	Tonnage.		Passengers.
			Registered.	Freight (tons).	
AMERICAN VESSELS.					
Steamers	615	$111,155,500	1,535,793	50,092,837	23,225
Sailing	119	5,036,500	166,506	4,157,610	
Unregistered				14,654	
Total	734	116,192,000	1,702,299	54,265,101	23.225
CANADIAN VESSELS.					
Steamers	127	10,424,000	117,750	3,556,996	36,723
Sailing	9	283,000	7,302	63,654	
Unregistered				9,398	
Total	136	10,707,000	125,052	3,630,048	36,723
Grand total	870	126,899,000	1,827,351	57,895,149	59,948

American vessels carried 94 per cent of the total freight and 39 per cent of the total passengers.

Canadian vessels carried 6 per cent of the total freight and 61 per cent of the total passengers.

Unregistered American craft carried 14,654 net tons of freight in 173 passages, or an average of 85 tons per passage.

Unregistered Canadian craft carried 9,398 net tons of freight in 69 passages, or an average of 136 tons per passage.

Of the 19,204 passages for the season, 2,371 were by 70 vessels under 100 tons register, with an average register of 34 tons. The total freight carried by such craft amounted to 780 net tons.

Average and limiting dimensions of vessels classified by maximum freight cargoes.

Freight tons in largest cargo.	Length.			Beam.			Actual draft.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Less than 100	142.0	40.0	68.2	27.4	10.0	18.0	12.0	5.0	9.2
100 to 1,000	225.0	55.0	164.3	35.7	13.0	29.5	15.0	8.5	12.5
1,000 to 2,000	320.0	172.0	210.4	42.2	30.3	35.2	18.0	11.0	14.6
2,000 to 3,000	356.5	203.0	263.1	44.0	35.0	39.8	19.0	14.0	16.6
3,000 to 4,000	365.0	243.7	289.2	50.0	35.7	41.9	20.0	16.5	18.5
4,000 to 5,000	372.0	300.0	335.0	47.0	39.0	43.4	19.3	17.0	18.7
5,000 to 6,000	416.0	315.0	372.8	51.2	41.0	46.6	20.0	17.7	19.2
6,000 to 7,000	444.0	364.0	387.0	51.4	44.2	48.2	20.5	18.5	19.5
7,000 to 8,000	476.0	393.6	425.7	52.0	44.9	49.9	20.2	19.2	19.7
8,000 to 9,000	488.0	418.0	449.3	56.2	49.0	51.5	29.1	18.5	19.7
9,000 to 10,000	510.0	460.0	492.1	56.2	51.0	52.7	20.2	19.3	19.8
10,000 to 11,000	555.5	498.0	522.7	56.0	52.0	54.0	20.1	18.9	19.8
11,000 to 12,000	577.8	524.0	549.3	60.2	54.0	56.1	20.4	19.3	19.9
12,000 to 13,000	607.0	550.0	578.5	60.2	56.0	57.4	20.5	19.3	19.9
13,000 to 14,000	605.0	600.0	601.1	58.0	58.0	58.0	20.3	20.0	20.1

Average and maximum dimensions of, and percentage of total freight carried by, vessels of different classes.

Class.	Number of boats of class using canal.	Aggregate registered tonnage.	Average registered tonnage.	Average length.	Maximum length.	Maximum beam.
Tons net register between—	*Number.*	*Tons.*	*Tons.*	*Feet.*	*Feet.*	*Feet.*
1 and 1,000	312	130,454	418	158	257	44
1,000 and 2,000	187	282,539	1,511	283	366	44.6
2,000 and 3,000	83	215,346	2,595	367	448	51.4
3,000 and 4,000	153	526,987	3,444	427	484	56.2
4,000 and 5,000	76	350,743	4,615	509	569	58.3
5,000 and 6,000	56	302,399	5,400	561	605	60.2
6,009 and over	3	18,883	6,294	606	607	60
Unregistered	....	....	....	....	....	....
Total	870	1,827,351	....	....	....	....

Class.	Number of passages of vessels of class.	Aggregate freight carried by vessels of class.	Average cargo.[a]	Percentage of total freight carried by class.
Tons net register between—	*Number.*	*Net tons.*	*Net tons.*	
1 and 1,000	4,911	1,866,226	380	3
1,000 and 2,000	3,005	6,180,459	2,057	11
2,000 and 3,000	1,859	6,284,207	3,380	11
3,000 and 4,000	4,085	18,173,615	4,449	31
4,000 and 5,000	2,400	13,266,913	5,528	23
5,000 and 6,000	1,908	11,551,706	6,054	20
6,000 and over	82	547,971	6,683	1
Unregistered	954	24,052	25	....
Total	19,204	57,895,149	....	100

[a] The "average cargo" as here given is the average cargo per passage. In obtaining these figures the passages when no cargo was carried are included.

Yearly statement of freight carried by steamers and sailing vessels.

Year.	Steamers.		Sailing.		Unregistered craft.		Total freight.	Percentage of freight carried by sailing vessels.[a]
	Number in commission.	Freight carried.	Number in commission.	Freight carried.	Number of passages.	Freight carried.		
		Net tons.		*Net tons.*		*Net tons.*	*Net tons.*	
1888	312	4,292,976	210	2,095,347	219	23,100	6,411,423	33
1889	345	5,175,799	231	2,304,538	443	35,685	7,516,022	31
1890	369	6,291,873	229	2,743,839	447	5,501	9,041,213	30
1891	396	6,420,939	256	2,456,091	447	11,729	8,888,759	28
1892	460	7,960,477	275	3,242,441	227	11,415	11,214,333	30
1893	459	7,723,153	294	3,034,084	213	39,335	10,796,572	28
1894	493	9,795,752	321	3,381,860	172	18,248	13,195,860	26
1895	522	10,581,474	355	4,464,671	232	16,435	15,062,580	30
1896	509	11,878,089	350	4,349,083	210	11,889	16,239,061	27
1897	525	13,163,667	323	5,790,326	377	28,762	18,982,755	31
1898	523	14,569,066	333	6,653,157	286	12,441	21,234,664	31
1899	542	17,801,213	290	7,423,311	366	31,286	25,255,810	29
1900	569	19,586,750	310	5,999,184	454	57,139	25,643,073	23
1901	598	21,186,571	295	7,166,694	413	49,800	28,403,065	25
1902	656	28,465,068	279	7,431,230	490	64,848	35,961,146	21
1903	652	28,042,546	243	6,594,304	361	37,587	34,674,437	19
1904	652	25,720,437	234	5,769,060	513	56,609	31,546,106	18
1905	692	37,724,522	218	6,479,506	729	66,652	44,270,680	15
1906	698	45,872,051	181	5,780,211	810	98,818	51,751,080	11
1907	727	52,937,151	152	5,249,806	346	30,257	58,217,214	9
1908	677	38,144,570	129	3,224,048	286	21,939	41,390,557	8
1909	742	53,649,833	128	4,221,264	242	24,052	57,895,149	7

[a] Sailing vessels include schooners, tow barges, and unrigged craft.

Yearly change in class of freighters as listed from their maximum freight cargoes.

NUMBER OF STEAMERS.

Year.	Net tons in maximum cargo between—											Total.
	1 and 1,000.	1,000 and 2,000.	2,000 and 3,000.	3,000 and 4,000.	4,000 and 5,000.	5,000 and 6,000.	6,000 and 7,000.	7,000 and 8,000.	8,000 and 10,000.	10,000 and 12,000.	12,000 and 14,000.	
1900	183	113	87	110	14	18	20	19	5	....	....	569
1901	164	118	88	124	17	26	26	31	4	....	....	598
1902	180	115	84	133	27	32	37	43	5	....	....	656
1903	173	104	71	136	24	37	42	52	13	....	....	652
1904	183	78	73	131	26	26	45	56	33	1	....	652
1905	164	96	80	130	31	19	40	55	57	17	8	692
1906	161	95	70	121	29	19	35	78	42	36	12	698
1907	158	90	61	115	27	16	43	47	93	55	22	727
1908	138	93	67	92	21	12	33	42	88	65	26	677
1909	162	73	67	104	17	30	48	55	90	77	24	742

NUMBER OF SAILING VESSELS.

1900	92	134	30	15	9	18	5	4	3	....	....	310
1901	86	117	24	25	13	15	7	2	6	....	....	295
1902	56	126	28	26	11	7	17	2	6	....	....	279
1903	39	115	18	26	12	4	21	2	6	....	....	243
1904	45	103	20	23	11	4	19	3	6	....	....	234
1905	39	94	21	18	13	3	17	5	8	....	....	218
1906	30	82	16	13	8	5	17	4	6	....	....	181
1907	34	65	10	10	7	4	15	5	2	....	....	152
1908	27	55	9	4	4	7	14	2	7	....	....	129
1909	20	57	11	6	8	2	15	3	6	....	....	128

Yearly change in class of freighters, etc.—Continued.

STEAMERS AND SAILING VESSELS COMBINED.

Year.	Net tons in maximum cargo between—											Total.
	1 and 1,000.	1,000 and 2,000.	2,000 and 3,000.	3,000 and 4,000.	4,000 and 5,000.	5,000 and 6,000.	6,000 and 7,000.	7,000 and 8,000.	8,000 and 10,000.	10,000 and 12,000.	12,000 and 14,000.	
1893...	264	320	154	15	....	....	....	....	....	....	....	753
1894...	265	339	192	18	....	....	....	....	....	....	....	814
1895...	279	400	176	18	4	....	....	....	....	....	....	877
1896...	281	335	168	43	21	11	....	....	....	....	....	859
1897...	262	280	133	111	26	28	8	....	....	....	....	848
1898...	273	266	116	118	26	34	18	5	....	....	....	856
1899...	243	245	109	139	22	32	27	10	5	....	....	832
1900...	275	247	117	125	23	36	25	23	8	....	....	879
1901...	250	235	112	149	30	41	33	33	10	....	....	893
1902...	236	241	112	159	38	39	54	45	11	....	....	935
1903...	172	259	89	162	36	41	63	54	19	....	....	895
1904...	228	181	93	154	37	30	64	59	39	1	....	886
1905...	203	190	101	148	44	22	57	60	65	17	3	910
1906...	191	177	86	134	37	24	52	82	48	36	12	879
1907...	192	155	71	125	34	20	58	52	95	55	22	879
1908...	165	148	76	96	25	19	47	44	95	65	26	806
1909...	182	130	78	110	25	32	58	58	96	77	24	870

Twenty-five new vessels were put in commission for the Lake Superior trade in 1909. They were all steamships for freight traffic. Ten of these new vessels are 500 feet or more in length and carry from 10,000 to 13,200 net tons of freight in a single cargo on a draft of 20 feet 1 inch.

Yearly individual maximum records.

STEAMERS.

Year.	Largest single cargo.		Greatest amount of freight carried.	
	Name of vessel.	Tons.	Name of vessel.	Tons.
1900....	John W. Gates	8,462	Presque Isle	195,580
1901....	Wm. Edenborn	8,222	.....do	161,375
1902....	I. L. Ellwood	8,441	Wm. Edenborn	183,270
1903....	Wm. Edenborn	8,914	John W. Gates	164,763
1904....	Aug. B. Wolvin	11,536	Aug. B. Wolvin	177,729
1905....	E. H. Gary	12,368	.....do	274,401
1906....	J. P. Morgan	13,272	E. H. Gary	313,434
1907....	.....do	13,800	J. P. Morgan	330,151
1908....	D. J. Morrell	13,978	.....do	289,952
1909....	E. Y. Townsend	13,664	E. Y. Townsend	312,196

Year.	Greatest number of miles run.		Greatest number of mile-tons.	
	Name of vessel.	Miles.	Name of vessel.	Mile-tons.
1900....	Troy	45,318	John W. Gates	154,554,378
1901....	Buffalo	41,370	John J. Albright	132,822,226
1902....	Troy	45,340	Wm. Edenborn	158,858,138
1903....	Buffalo	45,330	Bransford	158,843,973
1904....	Huronic	33,516	Aug. B. Wolvin	156,410,487
1905....	Duluth	41,374	.....do	249,638,482
1906....	E. H. Gary	42,986	E. H. Gary	249,353,656
1907....	J. P. Morgan	43,296	Aug. B. Wolvin	274,863,249
1908....	.....do	37,600	D. J. Morrell	243,087,661
1909....	E. Y. Townsend	44,443	E. Y. Townsend	280,610,200

Yearly individual maximum records—Continued.

SAILS.

Year.	Largest single cargo.		Greatest amount of freight carried.	
	Name of vessel.	Tons.	Name of vessel.	Tons.
1900	**Madeira**	8,206	**Madeira**	149,031
1901	**Manila**	8,288	**Marsala**	125,401
1902	John Smeaton	8,485	John Fritz	150,258
1903	**Manila**	8,671	Alex. Maitland	128,201
1904	John Smeaton	8,736	do	117,365
1905	do	9,184	**Manila**	155,772
1906	do	8,960	Alex. Maitland	141,770
1907	do	9,408	John Smeaton	152,144
1908	**Marsala**	9,408	do	135,744
1909	John Smeaton	9,520	do	157,702

Year.	Greatest number of miles run.		Greatest number of mile-tons.	
	Name of vessel.	Miles.	Name of vessel.	Mile-tons.
1900	**Madeira**	30,947	**Madeira**	124,399,966
1901	Sir I. L. Bell	26,424	do	99,419,012
1902	Alex. Holley	32,033	**Marsala**	119,437,488
1903	Barge No. 105	26,569	Alex. Maitland	114,536,002
1904	**Maida**	24,158	do	106,643,498
1905	**Marcia**	31,481	John Smeaton	127,243,648
1906	W. Le B. Jenney	31,575	Constitution	126,745,992
1907	John Smeaton	27,039	John Smeaton	121,205,504
1908	do	24,095	do	108,662,848
1909	Sid. G. Thomas	29,774	Alex. Maitland	138,383,760

The maximum freight traffic for a single day was on August 26, 1907, when 487,649 tons passed through the canals. The vessel passages on this day numbered 121, the aggregate registered tonnage being 287,385.

DELAYS.

The American canal records show that vessels necessarily spent 22,585 hours and 34 minutes in canal, or an average of 2 hours and 5 minutes, which includes time waiting for lockage and passage through locks and canal, the latter being 1⅝ miles long.

Other delays at canal, which included taking on supplies, waiting for daylight or favorable weather, amounted to 10,531 hours and 52 minutes.

Delays to vessels due to operating railway swing bridge amounted to 1 hour and 30 minutes.

Trains were delayed 18 hours and 56 minutes by passing boats temporarily preventing the closing of bridge.

The aggregate time the railway swing bridge was swung across the canal amounted to 909 hours and 8 minutes, during which time 3,256 engines, 4,751 passenger cars, and 26,143 freight cars crossed the bridge.

COMPARATIVE TRAFFIC—YEARS 1908 AND 1909.

Lake commerce through the canals at Sault Ste. Marie, Mich., and Ontario, for the seasons of 1908 and 1909.

Item.	Traffic for 1909.		Total traffic for—		Change.	
	United States canal.	Canadian canal.	Season 1909.	Season 1908.	Amount.	Per cent.
Vessel passages:						
Steamers..........number..	10,356	6,107	16,463	12,553	3,910	31
Sailing................do....	1,668	119	1,787	1,355	432	32
Unregistered..........do....	779	175	954	1,273	319	—25
Total..............do....	12,803	6,401	19,204	15,181	4,023	26
Lockages.................do....	8,607	4,964	13,571	10,685	2,886	27
Tonnage:						
Registered.............net..	28,939,463	17,812,254	46,751,717	31,091,730	15,659,987	50
Freight...............do....	30,132,374	27,762,775	57,895,149	41,390,557	16,504,592	40
Passengers............number..	27,736	32,212	59,948	53,287	6,661	13
Coal:						
Hard...........short tons..	1,060,753	351,634	1,412,387	1,384,743	27,644	2
Soft..................do....	6,150,540	2,377,099	8,527,639	8,517,717	9,922	....
Flour...................barrels..	4,580,833	2,513,342	7,094,175	5,704,375	1,389,800	24
Wheat.................bushels..	38,438,716	74,814,845	113,253,561	106,041,873	7,211,688	7
Grain, other than wheat..do....	17,990,396	28,529,055	46,519,451	43,458,583	3,060,868	7
Manufactured and pig iron, short tons....................	363,459	158,822	522,281	289,308	232,973	81
Salt....................barrels..	449,977	201,114	651,091	547,223	103,868	19
Copper.............short tons..	118,889	8,323	127,212	101,735	25,477	25
Iron ore..................do....	18,866,499	21,148,479	40,014,978	24,650,340	15,364,638	62
Lumber...........M feet b. m..	517,694	34,686	552,380	453,761	98,619	22
Silver ore...........short tons..	....	....	....	....	....	....
Building stone..........do....	1,784	....	1,784	1,019	765	75
General merchandise.....do....	595,564	544,780	1,140,344	842,901	297,443	35

YEARLY SUMMARIES SINCE 1887.

Total freight, its valuation, freight charges, average haul or distance freight was carried, and rate per ton per mile.

Year.	Total freight.	Valuation of freight.	Freight charges.	Average haul.	Freight charges per mile-ton.	Value of American craft.	Value of Canadian craft.
	Short tons.			*Miles.*	*Mills.*		
1887..............	5,494,649	$79,031,757	$10,075,153	811.4	2.3	$17,684,550	$2,089,400
1888..............	6,411,423	82,156,019	7,883,077	806.4	1.5	20,381,100	1,514,300
1889..............	7,516,022	83,732,527	8,634,246	790.4	1.5	25,328,600	1,597,600
1890..............	9,041,213	102,214,948	9,472,214	797.2	1.3	27,857,700	1,777,800
1891..............	8,888,759	128,178,208	9,849,022	820.4	1.35	31,947,300	2,119,500
1892..............	11,214,333	135,117,267	12,072,850	822.4	1.31	36,220,100	2,108,700
1893..............	10,796,572	145,436,957	9,957,483	831.9	1.1	39,017,400	2,115,700
1894..............	13,195,860	143,114,502	10,798,310	821.1	.99	41,124,200	1,959,800
1895..............	15,062,580	159,575,129	14,238,758	830.0	1.14	40,858,800	2,037,000
1896..............	16,239,061	195,146,842	13,511,615	836.4	.99	43,006,200	2,135,300
1897..............	18,982,755	218,235,927	13,220,099	841.3	.83	42,375,700	2,001,400
1898..............	21,234,664	233,069,740	14,125,896	842.6	.79	45,199,800	2,491,900
1899..............	25,255,810	281,364,750	21,959,707	827.2	1.05	65,000,520	3,369,600
1900..............	25,643,073	267,041,959	24,953,314	825.9	1.18	66,116,583	3,618,576
1901..............	28,403,065	289,906,865	23,217,974	823.3	.99	57,244,200	3,311,900
1902..............	35,961,146	358,306,300	26,566,189	827.4	.89	67,205,000	3,792,400
1903..............	34,674,437	349,405,014	26,727,735	835.6	.92	68,252,800	6,384,500
1904..............	31,546,106	334,502,686	21,552,894	843.5	.81	63,789,300	5,377,100
1905..............	44,270,680	416,965,484	31,420,585	833.3	.85	73,211,300	5,429,000
1906..............	51,751,080	537,463,454	36,666,889	842.4	.84	88,392,000	6,140,500
1907..............	58,217,214	569,830,188	38,457,345	828.3	.80	102,525,500	7,918,000
1908..............	41,390,557	470,141,318	23,903,244	842.0	.69	101,643,000	10,054,000
1909..............	57,895,149	626,104,173	36,291,948	809.0	.78	116,192,000	10,707,000

Freight rates for water transportation to and from Lake Superior.

Year.	Coal (net tons).	Flour (barrels).	Wheat (bushels).	Grain, other than wheat (bushels).	Manufactured iron (net tons).	Pig iron (net tons).	Salt (barrels).
1887	$0.90	$0.29	$0.07	$0.07	$2.35	$2.35	$0.18
1888	.70	.175	.035	.043	1.80	1.30	.16
1889	.47	.18	.04	.033	2.10	1.45	.19
1890	.45	.13	.03	.02	1.34	1.35	.15
1891	.43	.15	.046	.035	2.50	1.17	.18
1892	.41	.165	.036	.038	2.15	1.23	.15
1893	.40	.17	.028	.028	2.00	1.30	.12
1894	.40	.14	.025	.028	.90	1.15	.12
1895	.37	.14	.044	.045	1.50	1.05	.13
1896	.32	.11	.025	.023	1.40	1.05	.15
1897	.30	.10	.017	.02	1.40	1.05	.15
1898	.25	.10	.02	.02	1.40	1.05	.15
1899	.46	.13	.036	.036	1.70	1.50	.15
1900	.44	.12	.02	.02	2.00	1.50	.15
1901	.38	.12	.023	.022	2.00	1.50	.15
1902	.45	.12	.019	.019	2.00	1.50	.15
1903	.53	.12	.016	.016	2.00	1.50	.15
1904	.40	.13	.018	.018	2.00	1.50	[illegible]
1905	.33	.14	.023	.023	2.00	1.50	.13
1906	.35	.18	.022	.022	2.00	1.50	.12
1907	.31	.20	.019	.019	1.80	1.50	.12
1908	.30	.22	.012	.012	1.80	1.50	.15
1909	.31	.23	.02	.02	1.80	1.50	.15

Year.	Copper (net tons).	Iron ore (net tons).	Lumber (M feet b. m.).	Silver ore (net tons).	Building stone (net tons).	General merchandise (net tons).
1887	$2.60	$1.75	$4.00	$3.00	$1.15	$4.00
1888	2.35	1.28	2.80	1.90	2.05	1.00
1889	2.25	1.14	2.70	1.90	2.02	3.00
1890	2.38	1.10	2.38	2.25	2.00	2.75
1891	2.00	.98	2.70	2.25	2.00	3.55
1892	1.40	1.00	2.95	2.25	1.67	1.60
1893	1.75	.80	2.35	2.25	1.36	1.00
1894	1.95	.70	1.90	2.25	1.28	2.75
1895	1.66	.82	2.00	2.33	1.20	2.50
1896	1.95	.82	1.80	2.33	1.50	2.30
1897	1.95	.65	1.55	2.33	1.50	2.30
1898	2.00	.60	1.65	....	1.50	2.40
1899	2.00	.70	3.00	2.50	2.00	2.50
1900	1.60	1.05	2.30	2.00	1.50	2.00
1901	1.65	.78	2.55	....	1.50	2.25
1902	1.40	.68	2.45	2.00	1.50	2.00
1903	1.43	.75	2.50	....	1.50	2.00
1904	1.45	.63	2.55	2.00	1.50	2.00
1905	1.25	.68	2.45	2.00	1.50	2.00
1906	1.50	.67	2.70	....	1.50	2.00
1907	1.40	.67	2.50	....	1.50	2.00
1908	1.20	.58	2.60	....	1.50	2.00
1909	1.10	.59	2.40	....	1.50	2.00

Total freight valuations since 1887.

Year.	Coal (hard and soft).	Flour.	Wheat.	Grain (other than wheat).	Manufactured iron.	Pig iron.	Salt.
1887	$4,735,454	$7,863,675	$22,634,590	$759,653	$3,035,750	$241,468	$204,908
1888	7,367,644	10,953,625	18,224,424	1,981,862	2,442,950	252,348	210,433
1889	5,702,190	11,143,535	15,907,217	2,090,580	1,577,250	442,272	168,250
1890	7,619,238	16,195,520	15,893,022	2,003,496	4,680,750	386,104	179,431
1891	8,776,362	18,900,715	38,040,239	1,011,462	2,128,000	462,077	234,528
1892	10,164,931	21,672,540	30,746,085	933,346	2,988,600	709,716	275,740
1893	10,528,420	29,682,696	32,611,239	1,346,993	2,852,300	550,902	228,730
1894	8,191,917	33,621,649	22,316,469	772,504	1,805,350	331,452	237,461
1895	6,993,351	33,383,632	30,041,863	4,164,347	3,683,150	346,788	202,439
1896	8,452,073	34,199,003	47,442,347	10,704,748	4,696,200	377,298	178,136
1897	9,456,824	40,145,144	48,654,143	11,449,256	6,092,400	176,437	214,086
1898	10,334,461	33,056,683	49,871,997	13,039,192	10,709,350	476,775	226,170
1899	12,854,278	25,610,929	43,798,001	17,700,552	19,111,000	457,762	237,252
1900	14,620,840	27,042,752	28,342,511	14,071,953	11,551,000	351,313	328,895
1901	15,492,226	24,811,637	36,440,719	22,779,703	17,609,800	485,520	332,830
1902	16,570,398	31,185,840	55,246,295	25,521,556	20,323,380	277,925	288,149
1903	24,898,407	31,920,210	49,107,642	22,787,909	18,385,950	522,440	318,417
1904	19,657.221	25,907,959	52,425,313	23,121,694	18,512,600	672,885	255,821
1905	20,706,302	30,018,139	61,489,159	25,891,505	18,195,100	872,409	296,185
1906	25,136,044	27,280,470	67,417,086	38,583,640	29,614,880	387,002	351,121
1907	34,461,584	32,623,850	98,135,775	36,074,571	23,002,800	474,440	345,602
1908	28,868,837	29,947,969	107,102,292	37,374,381	20,275,950	331,835	410,417
1909	29,044,855	38,308,545	120,048,775	39,541,533	36,122,025	707,380	488,318

Year.	Copper.	Iron ore.	Lumber.	Silver ore and bullion.	Building stone.	General merchandise.	Total.
1887	$6,977,200	$8,741,995	$2,974,068	$53,826	$134,010	$20,675,160	$79,031,757
1888	5,792,000	8,996,808	4,326,696	520,579	335,410	20,751,240	82,156,019
1889	6,691,200	14,335,492	5,679,972	914,589	335,380	18,744,600	83,732,527
1890	8,745,800	16,711,688	6,514,722	527,807	479,730	22,277,640	102,214,948
1891	13,838,000	12,460,744	6,593,490	266,211	440.800	25,025,580	128,178,208
1892	12,998,600	17,153,962	9,231,192	296,815	396,980	27,548,760	135,117,267
1893	17,506,000	14,050,946	10,593,810	379,861	194,260	24,910,800	145,436,957
1894	19,914,600	17,027,078	11,564,608	46,144	214,170	27,071,100	143,114,502
1895	21,490,400	22,332,319	8,888,400	11,200	238,760	27,798,480	159,575,129
1896	23,374,400	25,705,062	8,562,325	26,880	177,310	31,251,060	195,146,842
1897	24,464,800	31,901,145	10,875,762	560	62,490	34,742,880	218,235,927
1898	29,814,240	35,120,880	12,984,532	....	46,700	37,388,760	233,069,740
1899	38,428,800	52,116,016	17,646,969	60,875	468,756	52,873,560	281,364,750
1900	39,319,800	61,663,380	15,009,241	13,750	586,824	54,139,700	267,041,959
1901	26,227,866	58,794,509	16,617,922	....	559,008	69,755,125	298,906,865
1902	22,916,280	75,260,420	17,736,404	125	467,028	92,512,500	358,306,300
1903	25,961,710	74,709,398	18,057,456	....	255,600	82,479,875	349,405,014
1904	26,305,200	52,034,862	16,388,220	74,580	325,116	98,821,215	334,502,686
1905	30,358,200	93,997,911	17,885,911	2,255	130,788	117,121,620	416,965,484
1906	36,595,220	121,981,795	19,813,882	....	74,664	170,227,650	537,463,454
1907	27,887,290	148,481,040	14,934,360	....	10,776	153,398,100	569,830,188
1908	26,044,160	83,811,156	9,528,981	....	10,190	126,435,150	470,141,318
1909	32,566,272	146,054,670	12,152,360	....	17,840	171,051,600	626,104,173

Unit freight valuation since 1887.

Year.	Coal, anthracite (per short ton).	Coal, bituminous (per short ton).	Flour (per barrel.	Wheat (per bushel).	Grain, other than wheat (per bushel).	Manufactured iron (per short ton).	Pig iron (per short ton).
1887	[a] $3.50	[a] $3.50	$5.00	$0.98	$0.98	$50.00	$17.00
1888	[a] 3.50	[a] 3.50	5.00	.98	.98	50.00	17.00
1889	[a] 3.50	[a] 3.50	5.00	.98	.98	50.00	17.00
1890	[a] 3.50	[a] 3.50	5.00	.98	.98	50.00	17.00
1891	[a] 3.50	[a] 3.50	5.00	.98	.98	50.00	17.00
1892	[a] 3.50	[a] 3.50	4.00	.75	.56	50.00	17.00
1893	[a] 3.50	[a] 3.50	4.00	.75	.56	50.00	17.00
1894	[a] 2.93	[a] 2.93	3.75	.64	.50	50.00	13.50
1895	4.25	2.40	3.75	.65	.50	50.00	13.00
1896	4.75	2.50	3.85	.75	.39	50.00	13.50
1897	5.50	2.60	4.50	.87	.46	50.00	13.25
1898	4.75	2.40	4.25	.80	.50	50.00	13.25
1899	5.70	2.60	3.60	.75	.59	100.00	19.50
1900	5.25	3.00	4.00	.70	.87	100.00	17.50
1901	5.60	2.90	3.25	.69	.92	100.00	16.00
1902	6.25	3.25	3.50	.72	.92	110.00	20.75
1903	5.80	3.15	4.50	.80	.71	110.00	20.00
1904	5.50	2.60	5.50	1.05	.70	100.00	15.00
1905	5.60	2.75	5.20	.90	.66	100.00	15.65
1906	5.75	2.50	4.20	.80	.71	80.00	18.50
1907	5.80	2.60	5.00	1.00	.83	80.00	23.25
1908	5.47	2.50	5.25	1.01	.86	75.00	17.50
1909	5.47	2.50	5.40	1.06	.85	75.00	17.40

Year.	Salt (per barrel).	Copper (per short ton).	Iron ore (per short ton).	Lumber (per M feet).	Silver ore (per short ton).	Building stone (per short ton).	General merchandise (per short ton).
1887	$1.00	$200.00	$3.50	$18.00	$153.79	$10.00	$60.00
1888	1.00	200.00	3.50	18.00	153.79	10.00	60.00
1889	1.00	200.00	3.50	18.00	153.79	10.00	60.00
1890	1.00	200.00	3.50	18.00	153.79	10.00	60.00
1891	1.00	200.00	3.50	18.00	153.79	10.00	60.00
1892	1.00	200.00	3.50	18.00	153.79	10.00	60.00
1893	1.00	200.00	3.50	18.00	153.79	10.00	60.00
1894	1.00	200.00	2.60	16.00	112.00	10.00	60.00
1895	.75	200.00	2.77	12.00	112.00	10.00	60.00
1896	.75	200.00	3.25	12.50	112.00	10.00	60.00
1897	.75	200.00	3.00	13.50	112.00	10.00	60.00
1898	.75	240.00	3.00	14.50	....	10.00	60.00
1899	.75	320.00	3.40	17.00	125.00	12.00	90.00
1900	1.00	300.00	3.75	16.50	125.00	12.00	100.00
1901	.75	266.00	3.25	15.50	....	12.00	125.00
1902	.65	190.00	3.10	16.25	125.00	12.00	125.00
1903	.70	230.00	3.45	18.00	....	12.00	125.00
1904	.70	240.00	2.65	17.75	55.00	12.00	135.00
1905	.70	285.00	3.00	18.50	55.00	12.00	140.00
1906	.75	340.00	3.45	22.00	....	12.00	150.00
1907	.75	310.00	3.75	23.00	....	12.00	150.00
1908	.75	256.00	3.40	21.00	....	10.00	150.00
1909	.75	256.00	3.65	22.00	....	10.00	150.00

[a] Average price for anthracite and bituminous coal combined.

Statement of commerce through both American and Canadian canals at Sault Ste. Marie, Michigan and Ontario, for each year from first opening in 1855.

Year.	Season.		Class and tonnage of vessels.					Passenger and freight traffic.			
	Date of opening canal.	Date of closing canal.	Passages by—			Total passages.	Net registered tonnage.	Passengers.	Coal.	Flour.	Wheat.
			Steamers.	Sailing vessels.	Unregistered craft.						
								Number.	*Short tons.*	*Barrels.*	*Bushels.*
1855	June 18	Nov. 23	149	44	......	193	106,296	8,295	1,414	10,289	....
1856	May 4	Nov. 28	178	112	......	290	101,458	7,992	3,968	17,686	....
1857	May 9	Nov. 30	184	192	......	376	180,820	6,650	5,298	18,515	....
1858	Apr. 18	Nov. 20	224	182	......	406	219,819	9,230	4,118	13,782	....
1859	May 3	Nov. 28	258	411	......	669	352,642	....	8,884	39,459	74
1860	May 11	Nov. 26	337	579	......	916	403,657	....	....	50,250	....
1861	May 3	Nov. 14	296	242	......	538	276,639	8,816	11,507	22,743	223
1862	Apr. 27	Nov. 27	295	543	......	838	359,612	8,468	11,346	17,291	....
1863	Apr. 28	Nov. 24	305	952	......	1,257	507,434	18,281	7,805	31,975	....
1864	May 2	Dec. 4	366	1,045	......	1,411	571,438	16,985	11,282	33,937	....
1865	May 1	Dec. 3	395	602	......	997	409.062	19,777	....	34,985	....
1866	May 5	...do....	453	555	......	1,008	458,530	14,067	19,915	33,603	....
1867	May 4	...do....	466	839	......	1,305	556,899	15,120	22,927	28,345	....
1868	May 2	...do....	338	817	......	1,155	432,563	10,590	25,814	27,372	....
1869	May 4	Nov. 29	399	939	......	1,338	524,885	17,657	27,850	32,007	....
1870	Apr. 29	Dec. 1	431	1,397	......	1,828	690,826	17,153	15,952	33,548	49,700
1871	May 8	Nov. 29	573	1,064	......	1,637	752,101	15,859	46,798	26,040	1,376,705
1872	May 11	Nov. 26	792	1,212	......	2,004	914,735	25,830	80,815	136,411	567,134
1873	May 5	Nov. 18	968	1,519	......	2,517	1,204,446	30,966	96,780	172,692	2,119,997
1874	May 12	Dec. 2	901	833	......	1,734	1,070,857	22,958	61,124	179,855	1,120,015
1875	...do....	...do....	1,464	569	......	2,033	1,259,534	19,685	101,260	309,991	1,213,788
1876	May 8	Nov. 26	1,733	684	......	2,417	1,541,676	20,286	124,960	390,577	1,971,549
1877	May 2	Nov. 30	1,050	1,401	......	2,451	1,439,216	21,800	91,575	355,117	1,349,738
1878	Apr. 8	Dec. 3	1,476	1,091	......	2,567	1,667,136	20,394	91,856	344,599	1,872,940
1879	May 2	...do....	1,618	1,403	100	3,121	1,677,071	18,979	110,704	451,154	2,603,666
1880	Apr. 28	Nov. 15	1,735	1,718	50	3,503	1,734,890	25,766	170,501	523,860	2,105,920
1881	May 7	Dec. 5	2,117	1,706	181	4,004	2,092,757	24,671	295,647	605,453	3,456,965
1882	Apr. 21	Dec. 3	2,739	1,663	372	4,774	2,468,088	29,256	430,184	344,044	3,728,856
1883	May 2	Dec. 11	2,620	1,458	237	4,315	2,042,259	39,130	714,444	687,031	5,900,473
1884	Apr. 23	Dec. 10	3,609	1,709	371	5,689	2,997,837	54,214	706,379	1,248,243	11,985,791
1885	May 6	Dec. 2	3,354	1,689	337	5,380	3,035,937	36,147	894,991	1,440,093	15,274,213
1886	Apr. 25	Dec. 4	4,584	2,534	306	7,424	4,219,397	27,088	1,099,999	1,759,365	18,991,485
1887	May 1	Dec. 2	5,968	2,562	825	9,355	4,897,598	32,668	1,352,987	1,572,735	23,096,520
1888	May 7	Dec. 4	5,305	2,009	489	7,803	5,130,659	25,558	2,105,041	2,190,725	18,596,351
1889	Apr. 15	...do....	6,501	2,635	443	9,579	7,221,935	25,712	1,629,197	2,228,707	16,231,854
1890	Apr. 20	Dec. 3	7,268	2,872	417	10,557	8,454,435	24,856	2,176,925	3,239,104	16,217,370
1891	Apr. 27	Dec. 7	7,339	2,405	447	10,191	8,400,685	26,190	2,507,532	3,780,143	38,816,570
1892	Apr. 18	Dec. 6	8,737	3,324	519	12,580	10,647,203	25,896	2,904,266	5,418,135	40,994,780
1893	May 1	Dec. 5	8,379	2,955	674	12,008	8,949,754	18,869	3,008,120	7,420,674	43,481,652
1894	Apr. 17	Dec. 6	10,208	3,676	607	14,491	13,110,366	27,236	2,797,184	8,965,773	34,869,483
1895	Apr. 25	Dec. 11	12,495	4,790	671	17,956	16,806,781	31,656	2,574,362	8,902,302	46,218,250
1896	Apr. 21	Dec. 8	13,404	4,391	820	18,615	17,249,418	37,066	3,023,340	8,882,858	63,256,463
1897	...do....	Dec. 14	12,029	4,438	704	17,171	17,619,933	40,213	3,039,172	8,921,143	55,924,302
1898	Apr. 11	...do....	12,461	4,449	851	17,761	18,622,754	43,426	3,776,450	7,778,043	62,339,996
1899	Apr. 26	Dec. 20	14,378	4,776	1,101	20,255	21,958,347	49,082	3,940,887	7,114,147	58,397,335
1900	Apr. 19	Dec. 16	14,426	4,004	1,022	19,452	22,315,834	58,555	4,486,977	6,760,688	40,489,302
1901	Apr. 20	Dec. 21	14,372	4,482	1,187	20,041	24,626,976	59,663	4,593,136	7,634,350	52,812,636
1902	Apr. 1	Dec. 20	17,069	4,368	1,222	22,659	31,955,582	59,377	4,812,478	8,910,240	76,730,965
1903	Apr. 2	Dec. 15	14,027	3,569	1,000	18,596	27,736,444	55,175	6,937,633	7,093,380	61,384,552
1904	Apr. 30	Dec. 26	12,188	2,994	938	16,120	24,364,138	37,695	6,454,869	4,710,538	49,928,869
1905	Apr. 10	Dec. 20	17,197	3,263	1,219	21,679	36,617,699	54,204	6,509,056	5,772,719	68,321,288
1906	Apr. 13	Dec. 22	18,138	2,817	1,200	22,155	41,098,324	63,033	8,739,630	6,495,350	84,271,358
1907	Apr. 22	Dec. 15	17,245	2,303	889	20,437	44,087,974	62,758	11,400,095	6,524,770	98,135,775
1908	Apr. 21	...do....	12,553	1,355	1,273	15,181	31,091,730	53,287	9,902,460	5,704,375	106,041,873
1909	Apr. 20	Dec. 16	16,463	1,787	954	19,204	46,751,717	59,948	9,940,026	7,094.175	113,253,561

St. Marys Falls Canal, Michigan, State lock, 1855 to 1887.
St. Marys Falls Canal, Michigan, Weitzel lock, since September 1, 1881.

***Statement of commerce through both American and Canadian canals at Sault Ste. Marie, Michigan and Ontario, for each year from first opening in 1855*—Continued.**

Year.	Passenger and freight traffic—Continued.									
	Grain (other than wheat).	Manufactured and pig iron.	Salt.	Copper.	Iron ore.	Lumber.	Silver ore and bullion.	Building stone.	General merchandise.	Total freight.
	Bushels.	*Short tons.*	*Barrels.*	*Short tons.*	*Short tons.*	*M feet b. m.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1855..	....	1,445	198	3,196	1,447	127	....	....	5,690	14,503
1856..	83,000	2,272	1,027	5,977	11,597	433	....	....	5,538	33,817
1857..	40,687	4,426	1,118	4,400	26,185	680	....	....	7,140	51,607
1858..	21,000	3,031	1,222	6,944	31,035	188	....	....	9,567	57,002
1859..	71,738	7,172	2,737	7,269	65,769	766	....	....	25,280	122,056
1860..	133,437	1,446	....	9,000	120,000	....	....	....	14,915	153,721
1861..	76,830	4,904	3,014	7,645	44,837	664	....	....	12,972	87,847
1862..	59,062	7,023	2,477	6,881	113,014	240	....	....	19,355	161,675
1863..	78,480	7,930	1,506	1,044	181,567	1,414	....	....	30,213	236,780
1864..	143,560	9,234	1,770	5,331	213,753	2,012	....	....	33,477	284,350
1865..	....	7,400	3,178	9,935	147,459	822	....	....	11,226	181,638
1866..	229,920	14,484	4,454	9,550	152,102	660	....	....	32,310	239,457
1867..	249,031	23,141	5,316	10,585	222,861	1,177	....	....	33,632	325,357
1868..	285,123	23,991	4,624	13,222	191,939	1,404	....	....	31,843	299,175
1869..	323,501	25,604	5,910	18,662	239,368	1,423	....	....	41,813	368,326
1870..	304,077	42,049	11,089	11,301	409,850	814	92	4,560	40,342	539,883
1871..	308,823	57,216	36,199	14,562	327,461	1,098	464	5,528	74,227	585,383
1872..	445,774	100,298	42,690	14,986	383,105	1,853	306	5,218	109,663	746,258
1873..	309,645	47,996	29,335	15,947	504,121	2,191	580	2,218	123,398	888,432
1874..	149,999	33,713	44,231	15,345	427,658	686	443	401	55,312	655,138
1875..	272,580	56,649	43,989	18,396	493,408	4,498	847	2,978	70,128	833,465
1876..	424,468	67,409	46,666	25,756	609,752	17,820	985	2,102	91,119	1,073,579
1877..	378,063	42,705	63,188	16,767	568,082	15,373	1,020	2,506	64,201	912,639
1878..	264,674	18,116	63,520	22,529	555,750	34,889	768	2,754	69,007	937,351
1879..	973,948	43,771	92,245	22,309	540,075	43,439	324	2,226	81,279	1,050,784
1880..	2,553,436	54,302	77,916	21,753	677,073	48,635	66	2,263	100,849	1,321,906
1881..	367,888	87,830	65,897	29,468	748,131	58,877	....	1,400	129,031	1,567,741
1882..	473,129	92,870	176,612	25,409	987,060	82,783	22	5,428	172,167	2,029,521
1883..	776,552	109,910	70,898	31,024	791,732	87,131	814	2,405	191,571	2,267,105
1884..	517,103	72,428	144,804	36,062	1,136,071	122,389	9,731	6,047	207,173	2,874,557
1885..	422,981	60,842	136,355	31,927	1,235,122	127,984	3,669	8,189	184,963	3,256,628
1886..	715,373	115,208	158,677	38,627	2,087,800	138,688	2,009	9,449	230,726	4,527,759
1887..	775,160	74,919	204,908	34,886	2,497,713	165,226	350	13,401	344,586	5,494,649
1888..	2,022,308	63,703	210,433	28,960	2,570.517	240,372	3,385	33,541	345,854	6,411,423
1889..	2,133,245	57,561	168,250	33,456	4,095,855	315,554	5,947	33,538	312,410	7,516,022
1890..	2,044,384	116,327	179,431	43,729	4,774,768	361,929	3,432	47,973	371,294	9,041,213
1891..	1,032,104	69,741	234,528	69,190	3,560,213	366,305	1,731	44,080	417,093	8,888,759
1892..	1,666,690	101,520	275,740	64,993	4,901,132	512,844	1,930	39,698	459,146	11,214,333
1893..	2,405,344	89,452	228,730	87,530	4,014,556	588,545	2,470	19,426	415,180	10,796,572
1894..	1,545,008	60,659	237,461	99,573	6,548,876	722,788	412	21,417	451,185	13,195,860
1895..	8,328,694	100,337	269,919	107,452	8,062,209	740,700	100	23,876	463,308	15,062,580
1896..	27,448,071	121,872	237,515	116,872	7,909,250	684,986	240	17,731	520,851	16,239,061
1897..	24,889,668	135,164	285,449	122,324	10,633,715	805,612	5	6,249	579,048	18,982,755
1898..	26,078,384	250,170	301,560	124,226	11,706,960	895,485	....	4,670	623,146	21,234,664
1899..	30,000,935	214,585	316,336	120.090	15,328,240	1,038,057	487	39,063	587,484	25,255,810
1900..	16,174,659	135,585	328,895	131,066	16,443,568	909,651	110	48,902	541,397	25,643,073
1901..	24,760,547	206,443	443,774	98,601	18,090,618	1,072,124	....	46,584	588,041	28,403,065
1902..	27,740,822	198,152	443,306	120,612	24,277,555	1,091,471	1	38,919	740,100	35,961,146
1903..	32,095,646	193,267	454,882	112,877	21,654,898	1,003,192	....	21,300	659,830	34,674,437
1904..	33,080,992	229,985	365,459	100,605	19,635,797	923,280	1,356	27,093	732,009	31,546,106
1905..	39,229,553	237,696	423,122	106,520	31,332,637	966,806	41	10,809	836,583	44,270,680
1906..	54,343,155	391,105	468,162	107,633	35,357,042	900,631	....	6,222	1,124,851	51,751,080
1907..	48,463,338	307,941	460,802	89,959	39.504,944	649,320	....	898	1,022,654	58,217,214
1908..	43,458,583	289,308	547,223	101,735	24,650,340	453,761	....	1,069	842,901	41,390,557
1909..	46,519,451	522,281	651,091	127,212	40,014,978	552,380	....	1,784	1,140,344	57,895,149

St. Marys Falls Canal, Michigan, Poe lock, since August 3, 1896.
Sault Ste. Marie Canal, Ontario, Canadian lock, since September 9, 1895.

Lockage data, St. Marys Falls Canal, Michigan.

Date.	Weitzel lock.			Poe lock.			Average time of passage of canal 1½ miles long, including lockage.	
	Number of lockages.	Average time of lockage.	Number of ships.	Number of lockages.	Average time of lockage.	Number of ships.	Actual.	Necessary.
		m. *s.*			*m.* *s.*		*h.* *m.*	*h.* *m.*
1887	4,165	38 47	9,355	....	....	....	....	....
1888	3,845	39 09	7,803	....	....	....	....	....
1889	4,684	40 03	9,579	....	....	....	....	....
1890	4,970	41 40	10,557	....	....	....	4 34	2 54
1891	4,981	41 11	10,191	....	....	....	4 17	2 50
1892	5,867	42 13	12,580	....	....	....	5 02	3 49
1893	5,553	40 40	12,008	....	....	....	4 13	3 15
1894	6,431	40 12	14,491	....	....	....	4 36	4 08
1895	7,039	39 06	16,793	....	....	....	5 46	4 58
1896	5,462	36 35	11,035	961	56 45	2,406	2 45	2 09
1897	1,577	38 59	2,677	4,390	43 14	10,135	2 16	1 42
1898	2,682	33 30	4,513	4,326	43 05	9,545	2 13	1 14
1899	4,007	32 05	6,935	4,382	46 58	9,545	2 19	1 14
1900	4,153	20 43	7,093	4,326	34 21	9,276	2 11	1 10
1901	4,074	24 22	7,004	4,337	36 02	8,833	2 41	1 34
1902	4,149	22 09	6,469	5,278	37 58	11,119	2 37	1 29
1903	3,467	20 37	5,173	4,928	34 45	9,070	2 21	1 24
1904	3,219	22 43	4,747	4,074	34 30	7,406	2 18	1 23
1905	4,469	23 57	6,561	5,288	35 15	9,458	2 11	1 39
1906	4,522	22 59	6,507	5,845	34 31	9,968	2 33	1 48
1907	3,941	23 29	5,616	5,487	35 09	8,475	2 40	2 09
1908	2,005	21 52	2,697	4,734	32 38	7,194	3 30	2 40
1909	3,548	21 23	4,629	5,059	35 34	8,174	3 04	2 05
Summation	98,810	32 37	185,013	63,415	37 21	120,604	3 09	2 14

A single steamer has been locked through the Weitzel lock in 10 minutes.
A single steamer has been locked through the Poe lock in 11 minutes.

MAXIMUM NUMBER OF LOCKAGES IN A DAY.

Date.	Number of lockages.	Number of ships.	Registered tonnage.	Freight tonnage.
WEITZEL LOCK.			*Net tons.*	*Net tons.*
July 19, 1895	41	100	79,197	58,897
July 28, 1895	41	85	89,574	88,298
July 9, 1896	41	81	68,324	54,813
POE LOCK.				
May 15, 1899	36	93	118,601	75,747
July 8, 1906	33	51	154,277	242,936
CANADIAN LOCK.				
June 6, 1907	34	56	90,525	96,827
July 10, 1909	36	43	146,957	222,101

MAXIMUM FREIGHT FOR A DAY.

WEITZEL LOCK.				
September 9, 1896	31	98	85,192	105,542
POE LOCK.				
September 2, 1907	28	49	160,179	295,542
CANADIAN LOCK.				
November 19, 1909	28	42	127,254	285,315

Comparative statement of traffic through Poe, Weitzel, and Canadian locks since the opening of the Canadian Canal in 1895.

Year.	Passages.	Lockages.	Registered tonnage.	Freight tonnage.	Passengers.
POE LOCK.					
[Opened August 3, 1896.]					
1896	2,401	961	2,992,200	3,489,448	3,695
1897	10,135	4,390	12,120,867	13,058,291	15,178
1898	9,545	4,326	13,224,816	16,664,519	11,112
1899	9,545	4,382	14,844,888	19,924,822	9,182
1900	9,276	4,326	15,632,102	21,548,949	12,125
1901	8,833	4,337	16,916,836	23,250,661	6,513
1902	11,119	5,278	22,260,719	29,735,671	10,792
1903	9,070	4,928	18,841,962	27,790,831	13,906
1904	7,406	4,074	15,882,986	24,640,923	8,355
1905	9,458	5,288	24,176,472	36,543,484	12,763
1906	9,968	5,845	28,138,888	43,083,490	14,202
1907	8,475	5,487	26,160,107	40,859,145	17,035
1908	7,194	4,734	18,816,998	27,839,530	18,224
1909	8,174	5,059	23,491,289	29,634,802	18,421
WEITZEL LOCK.					
1895	16,793	7,039	16,089,878	14,471,648	30,910
1896	11,040	5,462	9,904,788	8,189,576	18,743
1897	2,677	1,577	1,702,969	981,335	13,527
1898	4,513	2,682	2,646,793	1,519,632	16,446
1899	6,935	4,007	4,176,601	2,327,317	24,482
1900	7,093	4,153	4,504,680	2,058,405	24,188
1901	7,004	4,074	5,305,498	2,331,377	23,188
1902	6,469	4,149	5,147,302	1,497,124	11,986
1903	5,173	3,467	4,156,902	1,381,421	9,250
1904	4,747	3,219	4,277,056	1,876,993	13,251
1905	6,561	4,469	6,944,761	2,258,706	15,638
1906	6,507	4,522	6,650,905	2,096,802	16,723
1907	5,616	3,941	5,841,003	1,772,701	15,840
1908	2,697	2,005	2,670,501	817,767	4,855
1909	4,629	3,548	5,448,174	497,572	9,315
CANADIAN LOCK.					
[Opened September 9, 1895.]					
1895	1,163	695	716,903	590,932	746
1896	5,174	3,043	4,352,430	4,560,037	14,628
1897	4,359	2,604	3,796,097	4,943,129	11,508
1898	3,703	2,525	2,751,145	3,050,513	15,868
1899	3,775	2,610	2,936,858	3,003,671	15,418
1900	3,083	2,206	2,179,052	2,035,719	22,242
1901	4,204	2,910	2,404,642	2,821,027	29,962
1902	5,071	3,419	4,547,561	4,728,351	36,599
1903	4,353	3,247	4,737,580	5,502,185	32,019
1904	3,967	3,022	4,204,096	5,028,190	16,089
1905	5,660	4,035	5,496,466	5,468,490	25,803
1906	5,680	4,156	6,308,531	6,570,788	32,108
1907	6,346	4,592	12,086,864	15,585,368	29,883
1908	5,290	3,946	9,604,231	12,733,260	30,208
1909	6,401	4,964	17,812,254	27,762,775	32,212

Depth of water in Poe Lock (monthly averages from daily readings).

Year.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
1896	....	....	....	....	20.48	20.34	19.88	19.78	19.69
1897	19.36	19.82	20.22	20.63	20.80	20.60	20.31	19.99	19.77
1898	19.33	19.61	19.99	20.35	20.39	20.30	20.10	19.96	19.89
1899	20.01	19.94	20.47	20.84	20.98	21.01	20.70	20.44	20.37
1900	19.82	19.70	19.80	20.18	20.52	20.94	21.02	20.86	20.59
1901	20.11	19.96	20.20	20.39	20.60	20.17	20.08	19.72	19.42
1902	18.76	19.09	19.31	19.74	19.86	19.80	19.47	19.41	19.16
1903	18.95	19.33	19.55	19.84	19.97	20.08	20.01	19.71	20.31
1904	20.08	19.93	20.46	20.62	20.70	20.77	20.77	20.43	20.29
1905	19.89	20.04	20.29	20.70	20.75	20.78	20.72	20.43	20.14
1906	20.17	20.25	20.53	20.68	20.68	20.54	20.32	20.12	20.17
1907	19.90	19.85	20.25	20.49	20.70	20.84	20.43	19.97	19.56
1908	19.30	19.33	19.78	20.10	20.10	19.91	19.49	19.09	18.78
1909	18.29	18.63	18.96	19.19	19.39	19.18	19.00	18.56	18.70

Saw logs and pulp wood rafted down St. Marys Rapids.

Year.	No. of rafts.	Saw logs.	No. of rafts.	Pulp wood.
		Mft. b. m.		*Cords.*
1885	7	13,000		
1886	15	21,000		
1887	17	31,950		
1888	[a]17	29,450		
1889	5	9,000		
1890	11	20,450		
1891	12	25,800		
1892	22	39,500		
1893	16	29,100	1	500
1894	6	18,586		
1895	2	4,500		
1896	[a]3	2,200		
1897	2	4,500		
1898	2	3,000	2	3,700
1899	1	2,000	6	15,000
1900	5	8,500	5	15,500
1901	4	9,000	5	10,100
1902	2	5,000	5	6,500
1903				
1904			5	19,500
1905	3	1,300	6	16,000
1906	1	1,179	4	13,500
1907	1	1,160	9	25,000
1908				
1909				

[a] Includes one raft, the number of feet it contained not being known.

GROWTH OF LAKE SUPERIOR COMMERCE.

The movement of freight to and from Lake Superior previous to the opening of the state canal in 1855 was entirely by boat to Sault Ste. Marie, where the cargoes were unloaded, then taken across the portage 1 mile long and reloaded aboard boats.

In 1851 about 12,600 tons passed over the tramway portage; the transshipments to Lake Superior ports comprised the articles hay, oats, dry goods, groceries, and mining machinery, to the value of $1,000,000, and those to lower lake ports included copper, iron blooms, and fish, valued at $675,000.

During the fifty-five years the canal has been in commission the yearly traffic has increased from a minimum of 14,503 tons in 1855 to a maximum of 58,217,214 tons in 1907.

The increase in tonnage of each year's traffic over that of the preceding year has averaged about 20 per cent. For each decade the average percentage of yearly increase and the total tonnage are as follows:

	Tons.
1855–1864 (44 per cent)	1,203,358
1865–1874 (12 per cent)	4,829,247
1875–1884 (17 per cent)	14.868,639
1885–1894 (17 per cent)	80,343,218
1895–1904 (12 per cent)	253,002,697
1905–1909	253,524,680
Total	607,771,839

HISTORICAL NOTES.

The St. Marys Rapids are about half a mile wide and three-fourths of a mile long. The fall ranges from 16½ to 20½ feet with the varying stages of water.

The first canal was built on the Canadian side of the river by the Northwest Fur Company in 1797–98. The lock was 38 feet long, 8 feet 9 inches wide, with a lift of 9 feet. A towpath was made along the shore for oxen to track the bateaux and canoes through the upper part of the rapids. The lock, excepting its timber floor and miter sills, was destroyed in 1814 by United States troops from Mackinac Island under command of Major Holmes.

The first ship canal, known as the State Canal, was built on the American side of the river in 1853 to 1855, some 750,000 acres of land in Michigan having been granted by the United States Congress for the construction thereof. The canal was 1$\frac{1}{16}$ miles long, 64 feet wide at bottom, 100 feet wide at water surface, and 13 feet deep. There were two tandem locks of masonry, each 350 by 70 feet, having 11½ feet of water on the miter sills and a lift of about 9 feet each. Capt. A. Canfield, Topographical Engineers, U. S. Army, made the original surveys. Charles T. Harvey was superintendent of construction, and the St. Marys Falls Ship Canal Company was the contractor. The locks were destroyed in 1888 by excavations for the present Poe lock.

The Weitzel lock, 515 feet long, 80 feet wide in chamber, narrowing to 60 feet at the gates, with 17 feet depth of water on the miter sills when the upper pool is 601.9 feet and the lower pool 584.4 feet above mean tide at New York, was built by the United States in the years 1870 to 1881. During the same period the depth of the canal was increased to 16 feet, the mean width to 160 feet, and the stone slope walls were replaced with timber piers having a vertical face. Gen. Orlando M. Poe was the engineer officer in charge of the district from 1870 to 1873, and Gen. Godfrey Weitzel from 1873 to 1882. Alfred Noble was the assistant engineer in local charge from 1870 to 1882. Boyle & Roach were the principal contractors.

The Canadian canal, 1⅛ miles long, 150 feet wide, and 22 feet deep, with lock 900 feet long and 60 feet wide, having 22 feet of water on the miter sills, was built on the north side of the river in the years 1888 to 1895. Hon. Collingwood Schreiber was chief engineer of Dominion canals, etc., and W. G. McNeill Thompson was the government engineer in local charge of construction work. Ryan & Haney were the contractors.

The Poe lock, 800 feet long, 100 feet wide, and having 22 feet of water on the sills, was built by the United States in the years 1887 to 1896. Gen. Orlando M. Poe was the engineer officer in charge of the district from 1883 to 1895, and E. S. Wheeler the assistant engineer in local charge of construction work from 1882 to 1897. Hughes Bros. & Bangs were the principal contractors.

The American canal since 1892 has been deepened to 25 feet, and its entrance piers have been extended so that its total length at the falls is now 1⅜ miles. Its width is variable, being 500 feet at the upper entrance, 108 feet at the canal gate, 270 feet at the basin above locks, and 1,000 feet at the lower entrance. Dunbar & Sullivan and J. B. Donnelly were the principal contractors.

The canal also practically includes those parts of the channels through St. Marys River, which have been improved through shoals of sand, clay, bowlders, sandstone, and limestone rock. The United States Government made the first appropriation for improving the river channels in 1856. The Lake George route was improved for 12 feet draft, 1857 to 1860 and 1866 to 1869. The depth was increased to 16 feet, 1879 to 1883. The Hay Lake route was improved for a depth of 20 feet at mean stage of water, years 1882 to 1894. Betterment of the channels has been continued every year since, so that the dredged areas now total 34 miles in length with least width of 300 feet, increasing at angles and other critical places up to 1,000 feet. In 1903 excavation of channels was begun for 21 feet at lowest stage of water.

The engineer officers in past charge of the river improvements were: Capt. A. W. Whipple, 1858–1861; Col. T. J. Cram, 1866–1870; Maj. O. M. Poe, 1870–1873; Col. G. Weitzel, 1873–1882; Maj. F. U. Farquhar, 1882–83; Col. O. M. Poe, 1883–1895; Col. G. J. Lydecker, 1896–1902; Maj. W. H. Bixby, 1902–1904; and Col. Charles E. L. B. Davis, 1904–1908. J. Hickler & Sons, C. F. & H. T. Dunbar, and Carkin, Stickney & Cram were the principal contractors.

The cost of the several improvements, stated in round numbers, is as follows:

Locks and canal of 1855	$1,000,000
Weitzel lock	1,000,000
Poe lock	3,000,000
Widening and deepening canal	3,000,000
Improving channel through river	8,000,000
Canadian lock, canal and approaches	5,000,000

Hydraulic power is used for operating the American locks; a pressure of 115 pounds per square inch being used for the Weitzel lock machinery and a pressure of 200 pounds for the Poe lock machinery. Electricity generated by water power is used for operating the Canadian lock.

The Poe lock can be filled or emptied in about seven minutes, and the gates opened or closed in two minutes. The Weitzel lock can be operated in about the same time as the Poe lock. The Canadian lock can be operated in about 8 minutes. An up-lockage of a single boat 350 feet long has been made through the Poe lock in 11 minutes; but the average time spent in making a lockage last season was 36 minutes, this difference being due to the slow movement of boats while entering and leaving the locks and to the fact that in nearly half of the lockages more than one boat was passed. Frequently as many as five boats were included in a single lockage. The average time of lockage through the Canadian lock was about 23 minutes.

From 1855 to 1881 the canal was controlled by the State of Michigan and tolls were charged to cover operating and repair expenses, the rate at first being 6½ cents per registered ton, which was gradually reduced to 2½ cents. Similarly the minimum charge for lockage of a boat was reduced from $5 to $3. Since control was transferred to the United States in 1881, the American canal has been free for public use by all nations. Likewise the Canadian canal has not collected tolls for either foreign or domestic commerce.

The lock force under state control consisted of about 20 men, having one watch only, as night navigation on the river was then impossible. Under United States control two watches, of 12 hours each, were established in 1881, and same continued until 1891, when three watches of 8 hours each were organized. The force engaged in passing boats has been increased with the growth of commerce, the number now aggregating 74; in addition there are 19 others employed as clerks, watchmen, and janitors.

Expenditures for operating and care of St. Marys Falls Canal, Michigan.

Year.	Operating.	Repairs.	Total.	Cost per freight ton.
				Mills.
1882	$21,185.86	$6,360.00	$27,545.86	13.57
1883	22,134.97	14,200.80	36,335.77	16.03
1884	20,337.61	9,148.68	29,486.29	10.26
1885	18,635.27	10,429.25	29,064.52	8.92
1886	18,871.84	7,217.28	26,089.12	5.76
1887	18,887.11	2,945.44	21,832.55	3.97
1888	22,858.57	7,144.89	30,003.46	4.68
1889	23,987.45	6,616.16	30,603.61	4.07
1890	22,737.53	13,985.74	36,723.27	4.06
1891	34,657.27	10,303.52	44,960.79	5.06
1892	37,895.93	23,345.16	61,241.09	5.46
1893	34,402.15	7,425.92	41,828.07	3.87
1894	43,103.27	12,028.94	55,132.21	4.18
1895	39,063.20	11,472.41	50,535.61	3.49
1896	34,806.92	24,822.16	59,629.08	5.10
1897	46,750.02	32,457.13	79,207.15	5.64
1898	43,464.99	13,209.17	56,674.16	3.12
1899	65,142.64	23,858.24	89,000.88	4.00
1900	59,282.46	21,026.81	80,309.27	3.40
1901	59,457.05	16,102.29	75,559.34	2.95
1902	66,914.75	21,680.78	88,595.53	2.84
1903	62,648.42	20,297.67	82,946.09	2.84
1904	66,563.96	26,514.11	93,078.07	3.51
1905	64,423.96	20,998.96	85,422.92	2.20
1906	69,259.66	20,410.36	89,670.02	1.98
1907	68,162.42	21,664.84	89,827.26	2.11
1908	67,652.07	42,266.64	109,918.71	3.84
1909	68,963.78	37,550.48	106,514.26	3.53

N N 4.

IMPROVEMENT OF HAY LAKE AND NEEBISH CHANNELS, ST. MARYS RIVER, MICHIGAN.

The work in progress is under a project adopted by the river and harbor acts of June 13, 1902, and March 3, 1905, providing for a channel of 21 feet navigable depth at low water and a width of 1,500 feet from St. Marys Falls Canal to the upper entrance to Hay Lake (Little Rapids); thence a least width of 600 feet to deep water in Hay Lake; thence deepening to 21 feet the present 300-foot channel to Mud Lake via Middle Neebish, and opening a new 300-foot channel to Mud Lake via West Neebish, thus providing separate channels through this reach for up and down bound boats.

The excavation of the part of the channel relating to the route by way of the West Neebish was completed September 15, 1908, and opened to navigation on August 16, 1908.

The elevations above mean tide New York of the datum planes of improvement are as follows: At foot of locks, 580.4; at head of Little Rapids, 580.2; through Hay Lake, 579.3; West Neebish, a slope of 579.3 to 578.8; Middle Neebish, a slope of 579.3 to 578.9; Little Mud Lake, 578.9; Sailors Encampment and Mud Lake, 578.8.

Operations for the fiscal year were as follows:

The work of deepening the present Middle Neebish channel between Hay Lake and Mud Lake is being done in four sections.

The improvement of the channel across the flats, foot of Hay Lake, item M of the project, was commenced July 29, 1908, under contract dated May 16, 1908. During the year 4 dredges and 1 derrick boat were employed 4,637 hours, excavating and removing 524,470 cubic yards, scow measurement, of sand and clay from an area of 492,543 square yards; 200 pounds of dynamite was used in blasting bowlders. This item was completed and the contractor released on June 24, 1910, the contract time having been extended. The final quantities will be determined after surveys have been made. The contractor removed with a dredge 3 sunken cribs, in Hay Lake adjacent to this item, in 19.5 hours, at a cost of $585.

The improvement of the channel through the Middle Neebish Rapids, item N_1, of the project, was commenced June 21, 1908, under contract dated May 21, 1908. During the year 2 drill boats were employed 863.25 hours and drilled 9,457 holes to an average depth of 6 feet; 48,777 pounds of dynamite was used in blasting. Two dredges and 1 derrick boat were employed 1,089.5 hours and excavated 78,175 cubic yards, scow measurement, of sand, clay, bowlders, and sandstone rock from an area of 97,944 square yards. This item was completed October 9, 1909, in 74 per cent of the contract time. Total quantities removed, bank measurement, were 163,030 cubic yards full rate and 92,216 cubic yards half rate material, at a cost of $543,758.80.

The improvement of the channel through Little Mud Lake, item Q of the project, was commenced August 24, 1908, under contract dated August 11, 1908. During the year 1 dredge was employed 2,340.25 hours and removed 523,406 cubic yards, scow measurement, of sand, clay, and bowlders from an area of 549,612 square yards. A derrick boat was employed 40 hours removing bowlders passed by the dredge. Only a small amount of cleaning up remains to be done to complete this item.

The improvement of the channel at Sailors Encampment, item R of the project, was commenced August 28, 1908, under contract dated August 12, 1908. During the year 3 drill boats were employed 7,165.5 hours and drilled 11,115 holes to an average depth of 5 feet; 67,418 pounds of dynamite was used in blasting. Three dredges and 3 derrick boats were employed 5,074.33 hours and excavated 93,290 cubic yards, scow measurement, of sand, clay, gravel, bowlders, and rock from an area of 205,532 square yards. About 65 per cent of the work has been completed in 82 per cent of the contract time.

The work of constructing the wooden tug *West Neebish* was commenced on March 26, 1909, under contract dated February 9, 1909, and completed August 17, 1909, at a cost of $7,668.50.

Surveys were made on all items under contract, 133,000 soundings being made, reduced, and plotted.

The West Neebish channel was closed to navigation from May 21 to June 9, 1910, by the sinking of the steamer *John B. Ketcham 2d* in the rock cut just below the site of upper dam, blocking the channel. During this period the Middle Neebish route was used for both up and down bound boats, and a rigid supervision of traffic at critical points of the channel was maintained.

The construction, under permits granted by the Secretary of War, of several small docks along the river was supervised.

The discharge of the river through the Middle and West Neebish channels was approximately determined by current measurements. On account of the exceptional dimensions of these channels, tabulated statements of the results obtained are appended.

TABLE NO. 1.—*Total discharge Middle Neebish channel, July 1909.*

Number of discharge.	Date.	Time.	Mean water level.		Fall up-per to lower.	S=slope.	Total measured discharge.	Area section.	Mean velocity.	Hydraulic radius.	√RS	C.
			Upper gauge.	Lower gauge.								
	1909.				*Ft.*		*Cu. ft. secs.*	*Sq. ft.*	*Ft. sec.*	*Ft.*		
1.......	July 14	8.55- 4.20	581.141	580.973	0.168	0.0000259	27,167	17,770	1.53	12.14	0.0177	87
2.......	July 15	7.45- 2.38	581.208	581.035	.173	.0000266	28,967	17,840	1.64	12.22	.0180	91
3.......	July 20	7.51-12.27	581.223	581.166	.057	.0000088	24,302	17,940	1.35	12.29	.0103	131
4.......	July 21	8.10-12.35	581.338	581.186	.152	.0000234	28,309	17,910	1.58	12.27	.0169	93
5.......	July 23	8.16- 3.07	581.080	581.796	.284	.0000497	31,040	17,420	1.78	11.93	.0228	78
6.......	July 28	8.57- 2.35	581.273	581.136	.137	.0000211	27,812	17,910	1.55	12.27	.0164	95
7.......	July 29	8.01-12.05	581.218	581.070	.127	.0000228	27,421	17,840	1.54	12.22	.0167	92
	Mean	....	....	....	......	....	......	......	......	......	......	95⅓

TABLE NO. 2.—*Partial discharge Middle Neebish channel, July, 1909.*

Number of discharge.	Date.	Time.	Mean water level.		Fall, upper to lower.	S= slope.	Measured discharge through channel section only.	Area section.	Mean velocity.	Hydraulic radius.	√RS	C.
			Upper gauge.	Lower gauge.								
	1909.				*Ft.*		*Cu. ft. secs.*	*Sq. ft.*	*Ft. sec.*	*Ft.*		
1	July 14	8.55-11.33	581.132	580.946	0.186	0.0000286	20,551	9,904	2.04	21.5	0.0247	83
2	July 15	12.50- 2.38	581.190	581.023	.167	.0000257	21,000	9,933	2.11	21.5	.0235	90
3	July 20	7.51- 9.50	581.222	581.177	.045	.0000069	17,647	9,991	1.77	21.65	.0122	145
4	July 21	9.48-12.35	581.351	581.183	.168	.0000258	21,415	10,010	2.14	21.7	.0236	91
5	July 23	8.16-11.43	581.097	580.789	.308	.0000475	22,853	9,825	2.33	21.3	.0318	73
6	July 28	8.57-11.33	581.268	581,124	.144	.0000222	20,371	9,965	2.04	21.6	.0219	93
7	July 29	8.01-10.09	581.202	581.051	.151	.0000232	20,120	9,926	2.03	21.5	.0223	91
	Mean.	....	....	....	......	....	......	......	......	......	......	95¼

TABLE No. 8.—*Discharge West Neebish channel, June, 1909.*

Number of discharge.	Date.	Time.	Mean water level.		Fall upper to lower.	S= slope.	Measured discharge.	Area section.	Mean velocity.	Hydraulic radius.	$\sqrt{R S}$	C.
			Upper gauge.	Lower gauge.								
	1909.				*Ft.*		*Cu ft.-secs.*	*Sq. ft.*	*Ft.-sec.*	*Ft.*		
1.........	June 8	8.45–10.16	580.970	580.827	0.143	0.0000286	15,011	7,309	2.054	20.9	0.0244	84.2
2.........	...do.....	10.27–11.14	580.945	580.820	.125	.0000250	15,899	7,280	2.184	20.8	.0228	95.8
3.........	June 10	1.50–2.46	580.973	580.822	.151	.0000302	17,061	7,281	2.511	20.8	.0251	100.0
4.........	June 11	1.29–2.32	581.045	580.862	.183	.0000366	16,364	7,317	2.236	20.9	.0277	80.7
5.........	...do.....	2.45–3.32	580.990	580.829	.161	.0000322	18,412	7,308	2.519	20.9	.0259	97.3
6.........	June 14	6.54–8.03	580.839	580.628	.211	.0000422	19,165	7,256	2.641	20.7	.0296	89.2
7.........	...do.....	8.22–9.07	580.783	580.582	.201	.0000402	19,653	7,226	2.720	20.7	.0288	94.5
8.........	June 15	12.26–2.03	581.197	581.069	.128	.0000256	15,095	7,369	2.048	21.1	.0232	88.3
9.........	June 16	12.01–1.54	581.056	580.909	.147	.0000294	15,445	7,315	2.111	20.9	.0248	85.1
10.........	June 17	12.24–1.46	580.799	580.482	.317	.0000634	23,615	7,223	3.270	20.6	.0362	90.4
11.........	June 19	6.54–8.42	581.193	581.012	.181	.0000362	17,028	7,359	2.314	21.0	.0276	83.9

APPROPRIATIONS.

HAY LAKE CHANNEL.

As indicated in House Document No. 421, Fifty-seventh Congress, second session	$2,659,115

MIDDLE AND WEST NEEBISH CHANNELS.

June 13, 1902	500,000
March 3, 1903	800,000
March 3, 1905	1,200,000
June 30, 1906	1,000,000
March 4, 1907	1,000,000

HAY LAKE AND NEEBISH CHANNELS.

March 3, 1905	500,000
May 27, 1908	315,000
March 4, 1909	395,000
June 25, 1910	40,000
Total	8,409,115

CONTRACTS IN FORCE.

CONTRACT DATED MAY 16, 1908.

Name of contractor: Charles Simono, Two Rivers, Wis.

Amount and character of work: About $80,000; dredging item M, upper entrance Middle Neebish.

Price per unit: 17.7 cents per cubic yard, bank measurement (full rate), and 8.85 cents per cubic yard, bank measurement (half rate).

Date of approval: June 2, 1908.

Date of beginning work: July 29, 1908.

Date of expiration: October 8, 1909.

Date of completion: June 24, 1910.

CONTRACT DATED MAY 21, 1908.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.

Amount and character of work: $544,110.40; dredging item N_1, Middle Neebish.

Price per unit: $2.60 per cubic yard, bank measurement (full rate), and $1.30 per cubic yard, bank measurement (half rate).

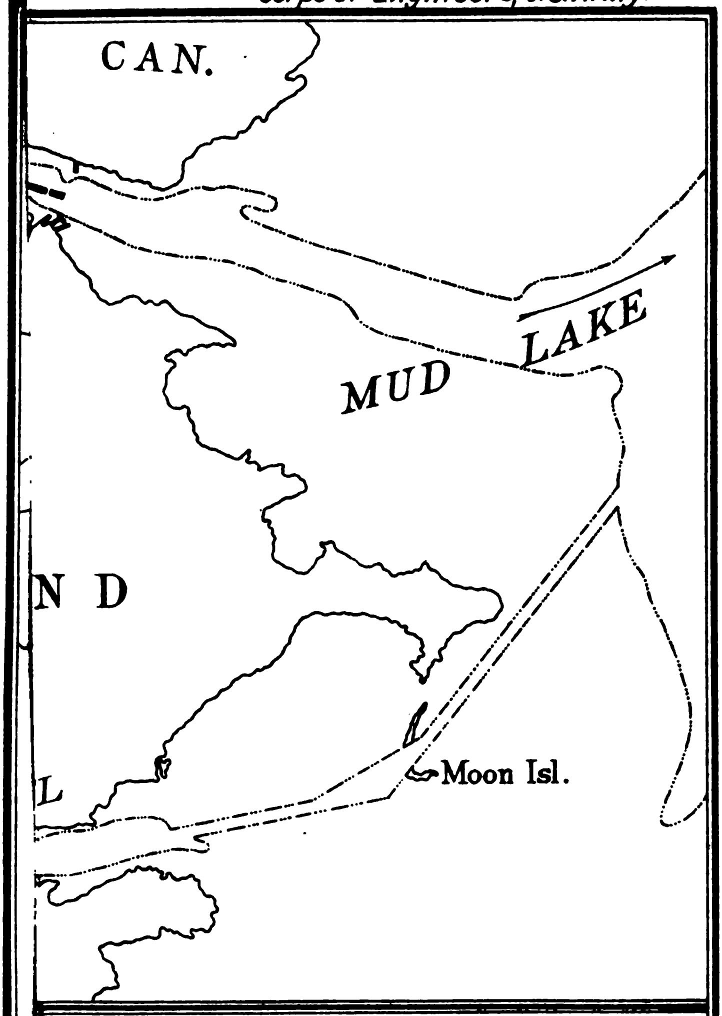
Date of approval: June 8, 1908.

Date of beginning work: June 22, 1908.

Date of expiration: November 11, 1909.

Date of completion: October 9, 1909.

Corps of Engineers, U.S. Army.



MAP OF
ST. MARYS RIVER,
MICHIGAN.

Showing

Work done during fiscal year 1909-10.

Transmitted with my annual report for
the fiscal year ending June 30th. 1910.

Colonel, Corps of Engineers, U. S. A.

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

CONTRACT DATED AUGUST 11, 1908.

Name of contractor: Lake Erie Dredging Company, Buffalo, N. Y.
Amount and character of work: About $82,000; dredging item Q, Little Mud Lake.
Price per unit: 24½ cents per cubic yard, bank measurement (full rate), and 12¼ cents per cubic yard, bank measurement (half rate).
Date of approval: August 22, 1908.
Date of beginning work: October 23, 1908.
Date of expiration: August 15, 1910.

CONTRACT DATED AUGUST 12, 1908.

Name of contractor: The Standard Contracting Company, Cleveland, Ohio.
Amount and character of work: About $242,000; rock and earth excavation at item R, Sailors Encampment.
Price per unit: $2.95 per cubic yard, bank measurement (full rate), and $1.47½ per cubic yard, bank measurement (half rate).
Date of approval: September 11, 1908.
Date of beginning work: November 12, 1908.
Date of expiration: September 3, 1910.

CONTRACT DATED FEBRUARY 9, 1909.

Name of contractor: Francis X. Payment, Sault Ste. Marie, Mich.
Amount and character of work: $7,668.50; constructing and delivering wooden tugboat.
Price per unit: $7,668.50—lump sum.
Date of approval: February 17, 1909.
Date of beginning work: March 1, 1909.
Date of expiration: June 1, 1909.
Date of completion: August 17, 1909.

N N 5.

IMPROVEMENT OF MACKINAC HARBOR, MICHIGAN.

No work was in progress during the past fiscal year.

The river and harbor act approved June 25, 1910, appropriated $25,000 for the construction of breakwaters at this locality in accordance with the report submitted in House Document No. 646, Fifty-sixth Congress, first session. The funds will be applied to the construction of the substructure of the breakwater extending from Mission Point and the funds required on the substructure of the breakwater extending from Biddle Point.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$25,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATION.

June 25, 1910	$25,000

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[a] Exclusive of the balance unexpended July 1, 1910.

N N 6.

IMPROVEMENT OF CHEBOYGAN HARBOR, MICHIGAN.

There was no work in progress during the past fiscal year.

There still remains an unimproved stretch included in the 18-foot channel project extending down 900 feet from the State Road Bridge. The estimated cost of this work is $14,000, all of which will have to be provided by appropriation, as the estimated balance of $9,000 can be applied to maintenance only.

APPROPRIATIONS.

Total amount appropriated previous to June 3, 1896 (as given in H. Doc. No. 421, 57th Cong., 2d sess.)	$148,000
June 3, 1896	12,000
March 3, 1899	8,000
June 13, 1902	8,000
March 3, 1905	7,500
March 2, 1907	15,000
Total	198,500

COMMERCIAL STATISTICS, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	977	131	1,108	32,371
Sailing	70	3	73	20,552
Unregistered rafts	3		3	
Total	1,050	134	1,184	52,923

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Brick	71,000	177	$710.00
Cedar posts	99,000	1,980	14,896.00
Cedar ties	70,000	3,850	38,500.00
Cement	30 barrels	6	45.00
Coal, hard	1,000 tons	1,000	5.470.00
Coal, soft	1,282 tons	1,282	3,206.00
Fish	25 tons	25	3,000.00
Grain	3,875 bushels	106	3,[illegible].75
Gasoline	103 barrels	20	566.50
Hay and feed	387 tons	387	5,805.00
Iron ore	555 tons	555	2,025.75
Logs	12,625,000 cubic feet	265,125	1,518,600.00
Lumber	28,197,000 feet b. m.	49,336	620,334.00
Merchandise	3,690 tons	3,690	553,500.00
Pulp wood	8,450 cords	16,950	67,600.00
Salt	700 barrels	98	525.00
Staves	125,000	312	1,000.00
Stone	303 cords	4,061	2,424.00
Straw	16 tons	16	160.00
Tan bark	340 cords	340	1.700.00
Wood	137 cords	205	686.00
Total		349,521	2,840,390.00

N N 7.

IMPROVEMENT OF HARBOR AT ROGERS CITY, MICHIGAN.

No work was in progress during the past fiscal year.

The river and harbor act approved June 25, 1910, appropriated $6,000 to dredge a channel 200 feet wide and 16 feet deep at mean lake level across the bar in front of the town, in accordance with the report of the Board of Engineers for Rivers and Harbors, dated February 9, 1910, and printed in River and Harbors Committee Document No. 28, Sixty-first Congress, second session. These funds will be expended for the purpose designated during the next fiscal year.

APPROPRIATION.

June 25, 1910	$6,000

N N 8.

IMPROVEMENT OF ALPENA HARBOR (THUNDER BAY RIVER), MICHIGAN.

There was no work in progress during the past fiscal year.

Original estimate of cost, 1876, 1881, and 1889 (aggregate)	$55,851.48
Whole amount expended to June 30, 1910	55,413.02

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $10,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total amount appropriated previous to September 19, 1890 (as given in H. Doc. No. 421, 57th Cong., 2d sess.)	$19,500
Thunder Bay Harbor, Michigan: September 19, 1890	5,500
Thunder Bay River, Michigan:	
September 19, 1890	10,000
July 13, 1892	10,000
Alpena Harbor, Michigan:	
August 18, 1894	4,000
June 3, 1896	2,500
March 2, 1907	4,000
June 25, 1910	5,000
Total	60,500

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened March 29, 1909; closed December 16, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	2,560	1	2,561	889,644
Sailing	37	....	37	11,326
Unregistered:				
Motor boats	55	....	55	....
Sailing	8	....	8	....
Rafts	6	....	6	....
Total	2,666	1	2,667	900,970

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
Brick	30,000	75	$300.00
Cedar posts	888,155	17,763	183,223.25
Cedar ties	482,679	27,097	270,973.45
Cement	371,525 barrels	55,728	557,287.50
Coal, hard	20,000 tons	20,000	109,400.00
Coal, soft	75,357 tons	75,357	188,392.50
Fish	616 tons	616	73,920.00
Flour	10,000 barrels	1,000	54,000.00
Grain	9,378 bushels	257	7,971.30
Hay and feed	6,700 tons	6,700	100,500.00
Iron, manufactured	4,027 tons	4,027	302,025.00
Lath	1,155,000	346	4,042.50
Logs	120,000 cubic feet	2,520	14,400.00
Lumber	32,358,038 feet b. m.	56,626	711,876.84
Merchandise	17,207 tons	17,207	2,581,050.00
Paper	375,000 pounds	187	9,375.00
Salt	18,000 barrels	2,520	13,500.00
Shingles	4,900,000	735	17,150.00
Stone, crushed	359,729 tons	359,729	179,864.50
Total	....	648,490	5,329,251.84

N N 9.

IMPROVEMENT OF SAGINAW RIVER, MICHIGAN.

At the beginning of the present fiscal year work was in progress under the contract with the Toledo Dredge and Dock Company of February 4, 1908, for dredging section B.

On August 16, 1909, a contract was entered into with G. H. Breymann & Bro., of Toledo, Ohio, to deepen the channel in the bay to project depths and to remove a few shoals in the river below the Interurban Bridge.

The work under contract with the Toledo Dredge and Dock Company, which was done with a hydraulic dredge, was completed July 10, 1909, a total of 235,000 cubic yards of sand, clay, and hardpan being removed, at a cost of 28 cents per cubic yard, bank measurement. As a result of the work done under this contract, a channel 12 feet deep and 200 feet wide was secured from the Interurban Bridge to the Michigan Central Railroad bridge in Saginaw, completing the project for this portion of the river, and 12 feet deep and 150 feet wide to 400 feet above Center Street Bridge.

The work under the contract with G. H. Breymann & Bro. was commenced on September 7, 1909, and completed on May 13, 1910. The total number of cubic yards removed was 131,942, from the following localities: From Saginaw Bay, 107,823; from vicinity of Interurban Bridge, 16,026; and from upper end of Crow Island, 8,093.

On June 1, 1910, G. H. Breymann & Bro. commenced work under oral agreement to remove some shoals below the Interurban Bridge, and completed same June 9, 1910.

The result of the dredging has been to restore the river to project depths.

A survey of the river was made during the past fiscal year to ascertain the amount of material necessary to remove to make a channel 18 feet deep in the bay and 16 feet in the river. The estimated amounts to be removed are as follows: Four hundred and seventy thousand cubic yards from deep water in the bay to the mouth of the river, and 2,506,000 cubic yards from the mouth to the juncture of the Tittabawassee River.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $300,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Total amount appropriated previous to August 2, 1882 (as given in H. Doc. No. 421, 57th Cong., 2d sess.)	$220,000.00
August 2, 1882	125,000.00
July 5, 1884	50,000.00
August 5, 1886	33,750.00
August 11, 1888	65,000.00
September 19, 1890	75,000.00
July 13, 1892	100,000.00
August 18, 1894	40,000.00
June 3, 1896	40,000.00
March 3, 1899	40,000.00
June 13, 1902	50,000.00
March 3, 1905	30,000.00
March 2, 1907	75,000.00
March 3, 1909 (allotment of April 7, 1909)	25,000.00
June 25, 1910	50,000.00
	1,018,750.00
Repayments	1.84
	1,018,751.84
Carried to surplus fund	1,000.00
Balance	1,017,751.84
Estimated cost of successive projects, 1867 to 1882	289,795.00
Estimated cost of project for 1882	446,000.00
Total	735,795.00
Carried to surplus fund	1,000.00
Whole amount expended to June 30, 1910	962,558.10

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACTS IN FORCE.

Name of contractor: Toledo Dredge and Dock Company, Toledo, Ohio.
Character and amount of work: Dredging 235,000 cubic yards.
Price: 28 cents per cubic yard, bank measurement.
Dated: February 4, 1908.
Date of beginning work: May 27, 1908.
Date of completion: July 10, 1909.

Name of contractor: G. H. Breymann & Bro., Toledo, Ohio.
Character and amount of work: Dredging 131,942 cubic yards.
Price: 18 cents for 107,823 cubic yards and 25 cents for 24,119 cubic yards.
Dated: August 16, 1909.
Date of beginning work: September 7, 1909.
Date of completion: May 13, 1910.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened April 15, 1909; closed December 6, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	195	81	276	115,332
Sailing	181	98	279	115,839
Unregistered, rafts	3		3	
Total	379	179	558	231,171

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Brick	2,000	5	$20.00
Cement	79,667 barrels	11,381	119,500.50
Coal, hard	2,000 tons	2,000	10,940.00
Coal, soft	4,112 tons	4,112	10,280.00
Flour	2,690 barrels	269	14,526.00
Gravel	1,425 tons	1,425	855.00
Lath	9,320,000	2,795	32,620.00
Logs	5,434,000 cubic feet	114,113	652,080.00
Lumber	108,621,000 feet b. m.	190,039	2,389,662.00
Machinery	5 tons	5	375.00
Merchandise	5,600 tons	5,600	840,000.00
Pickets	1,604,149	1,443	16,040.00
Salt	14,000 barrels	2,000	10,500.00
Sand, molding	750 tons	750	3,000.00
Stone	1,131 cords	6,786	9,048.00
Total		342,723	4,109,446.50

N N 10.

IMPROVEMENT OF SEBEWAING RIVER, MICHIGAN.

No work was in progress during the past fiscal year.

The commerce of this river has continually diminished during the past ten years and amounted to only 1,325 tons in 1908. During the past fiscal year no record was kept of the commerce of this river.

The river is used by fishing craft and pleasure boats. The amount of commerce does not warrant further improvement.

APPROPRIATIONS.

Total amount appropriated previous to June 3, 1896 (as given in H. Doc. No. 421, 57th Cong., 2d sess.)	$15,000
June 3, 1896	5,000
March 3, 1899	32,000
March 3, 1905	5,000
March 2, 1907	2,000
Total	59,000

N N 11.

IMPROVEMENT OF HARBOR OF REFUGE AT HARBOR BEACH, LAKE HURON, MICHIGAN.

During August, 1909, some repairs were made to the wooden superstructure of the south pier. The timber in the superstructure of the north pier is in a very advanced stage of decay. It is proposed to replace this with a concrete superstructure during the coming year.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $75,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

March 3, 1871	$100,000.00	March 3, 1899	$50,000.00
June 10, 1872	100,000.00	June 6, 1900	150,000.00
March 3, 1873	75,000.00	June 13, 1902	7,500.00
June 23, 1874	75,000.00	April 28, 1904	50,000.00
March 3, 1875	100,000.00	March 3, 1905	200,000.00
August 14, 1876	75,000.00	March 2, 1907	150,000.00
June 18, 1878	100,000.00	March 3. 1909 (allotment of Apr. 7, 1909)	10,000.00
March 3, 1879	75,000.00		
June 14, 1880	75,000.00	June 25, 1910	100,000.00
March 3, 1881	50,000.00		
August 2, 1882	75.000.00	Total	2,053,500.00
July 5, 1884	75,000.00	Carried to surplus fund	30.000.00
August 5, 1886	75,000.00		
August 11, 1888	70,000.00		2,023,500.00
September 19, 1890	30,000.00	Received from other sources	2,867.21
July 13, 1892	150,000.00		
August 18, 1894	20,000.00		
June 3, 1896	16,000.00	Total	2,026,367.21

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

TABLE No. 1.—*Summary of vessels sheltered in the harbor of refuge at Harbor Beach, Mich., from July 1, 1909, to June 30, 1910, and the direction of wind at time of entering the harbor.*

Direction of wind at time of entering.	1909.						1910.				Total.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	
North:											
Steam	14	2	17	1	8	......	1	22	11	6	82
Sail	......	......	1	......	......	......	......	1	......	......	2
Tows	4	......	1	......	7	......	......	3	3	......	18
Total	18	2	19	1	15	......	1	26	14	6	102
Northwest:											
Steam	22	26	25	22	17	2	1	2	23	13	153
Sail	1	3	2	1	1	......	......	......	1	......	9
Tows	8	4	7	13	2	......	......	......	5	......	39
Total	31	33	34	36	20	2	1	2	29	13	201
West:											
Steam	3	4	6	11	11	9	2	......	6	7	59
Sail	......	......	......	1	......	1	......	......	......	......	2
Tows	......	1	5	2	2	......	......	......	......	1	11
Total	3	5	11	14	13	10	2	......	6	8	72
Southwest:											
Steam	32	32	25	31	20	19	2	1	9	17	188
Sail	2	3	3	2	1	......	......	......	......	1	12
Tows	......	......	4	5	5	......	......	2	2	......	18
Total	34	35	32	38	26	19	2	3	11	18	218
South:											
Steam	7	2	4	5	4	2	......	2	......	......	26
Sail	1	......	......	1	......	......	......	......	......	......	2
Tows	......	......	......	2	......	......	......	......	......	......	2
Total	8	2	4	8	4	2	......	2	......	......	30
Southeast:											
Steam	16	24	25	8	13	4	2	8	12	13	125
Sail	......	1	......	2	3	......	......	......	......	2	8
Tows	1	3	1	1	1	1	1	1	......	1	11
Total	17	28	26	11	17	5	3	9	12	16	144
East:											
Steam	......	3	......	......	2	1	......	5	......	1	12
Sail	......	......	......	......	......	......	......	......	......	......	......
Tows	......	1	......	......	1	......	......	2	......	......	4
Total	......	4	......	......	3	1	......	7	......	1	16
Northeast:											
Steam	1	4	17	10	8	2	1	9	14	12	78
Sail	......	......	1	......	1	......	......	......	1	2	5
Tows	......	......	......	......	1	......	......	1	1	3	6
Total	1	4	18	10	10	2	1	10	16	17	89
Total each month:											
Steam	95	97	119	88	83	39	9	49	75	69	723
Sail	4	7	7	7	6	1	......	1	2	5	40
Tows	13	9	18	23	19	1	1	9	11	5	109
Total	112	113	144	118	108	41	10	59	88	79	872

TABLE No. 2.—*Classified table of tonnage, by months, of vessels sheltered in the harbor of refuge at Harbor Beach, Mich., from July 1, 1909, to June 30, 1910.*

Date.	Steam.		Sail.		Tow.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
1909.								
July	95	90,413	4	252	13	6,590	112	97,255
August	97	95,304	7	799	9	4,226	113	100,329
September	119	114,528	7	1,007	18	12,747	144	128,282
October	88	88,654	7	1,265	23	15,602	118	105,521
November	83	92,930	6	777	19	11,681	108	105,388
December	39	54,933	1	88	1	629	41	55,650
1910.								
March	9	2,504	0	00	1	384	10	2,888
April	49	36,390	1	88	9	6,271	59	42,749
May	75	62,543	2	287	11	6,399	88	69,229
June	69	64,323	5	496	5	2,765	79	67,584
Total	723	702,522	40	5,059	109	67,294	872	774,875

TABLE No. 3.—*Number and tonnage of vessels entering the harbor of refuge at Harbor Beach, Mich., 1877 to 1909, inclusive.*

Calendar year.	Steam.	Tow.	Sail.	Total.	Total vessels.	Average tonnage.
	Tons.	*Tons.*	*Tons.*	*Tons.*		
1877	63,966	50,954	27,699	142,619	493	289
1878	104,025	99,282	39,699	243,006	781	311
1879	133,080	100,096	45,750	278,926	921	303
1880	158,702	147,260	55,630	361,592	1,317	275
1881	144,645	127,855	55,960	328,460	1,176	279
1882	146,132	114,067	26,504	286,703	1,022	280
1883	177,122	114,091	32,713	323,926	1,139	284
1884	156,518	122,980	34,724	314,222	1,142	275
1885	196,364	151,607	29,426	377,397	1,158	325
1886	196,335	140,862	33,790	370,987	1,304	284
1887	271,327	153,087	33,680	458,094	1,447	317
1888	271,917	202,191	39,756	513,864	1,624	316
1889	289,719	165,896	37,922	493,537	1,512	326
1890	325,852	169,104	38,826	533,782	1,575	339
1891	292,917	171,067	27,076	491,060	1,341	366
1892	362,486	162,605	29,465	554,556	1,441	385
1893	243,451	113,915	20,897	378,263	982	385
1894	321,511	134,034	22,961	478,506	1,150	416
1895	356,532	167,237	26,898	550.667	1,204	457
1896	246,477	105,988	24,621	377.086	1,073	351
1897	304,460	153,776	21,151	479,387	1,205	398
1898	505,630	107,176	18,090	630,896	1,204	525
1899	590,547	81,143	20,854	692,544	1,254	544
1900	617,161	124,924	20,919	763,004	1,266	605
1901	744,154	151,023	16,841	912,018	1,338	682
1902	747,179	124,139	21,871	893,189	1,349	662
1903	662,724	105,650	12,167	780,541	1,081	722
1904	601,872	67,474	9,582	678,928	922	736
1905	695,246	94,152	10,843	800,241	1,099	728
1906	684,995	79,821	7,059	771,875	954	809
1907	605,647	92,049	3,922	701,618	887	791
1908	581,716	36,160	4,388	622,264	703	885
1909	678,717	61,330	4,838	744,885	827	901
Total	12,479,126	3,992,995	856,522	17,328,643	38,291	....

N N 12.

IMPROVEMENT OF MOUTH OF BLACK RIVER, ROUGE RIVER, AND MONROE HARBOR, MICHIGAN.

(A) MOUTH OF BLACK RIVER.

No material has been removed from this shoal by the General Government during the past fiscal year, but private parties during the past few years have removed a large amount of sand and gravel from this vicinity for commercial purposes. The Canadian government has also undertaken extensive improvements at Point Edward, on the opposite bank of St. Clair River.

The St. Clair River for about 2 miles below Lake Huron has a steep slope, and an enlargement of its cross section will tend to lower the level of Lake Huron. The city of Port Huron has a permit to divert certain waters from Lake Huron into Black River for the purpose of purifying its sewerage, which to a slight extent will also tend to lower the level of the lake.

The improvement is of no benefit to vessels engaged in through commerce having a draft of over 18 feet, and is only utilized locally to a limited extent. In view of the possible danger to the entire commerce of Lakes Huron and Michigan, it is recommended that dredging on this bar be suspended.

Original estimated cost (1871) of removing middle ground to depth of—	
15 feet	$67,320.00
18 feet	157,520.00
Whole amount expended to June 30, 1910	97,856.89

APPROPRIATIONS.

Total amount appropriated previous to August 11, 1888 (as given in H. Doc. No. 421, 57th Cong., 2d sess.)	$56,500
August 11, 1888	10,000
September 19, 1890	10,000
July 13, 1892	10,000
August 18, 1894	4,000
June 3, 1896	4,000
March 3, 1899	4,000
June 13, 1902 (allotment of Sept. 8, 1902)	1,000
March 2, 1907 (allotment of Mar. 22, 1907)	1,000
Total	100,500

(B) ROUGE RIVER.

At the beginning of the present fiscal year operations were in progress under the emergency contract with G. H. Breymann and Brother, of Toledo, Ohio, dated May 1, 1909. Four thousand eight hundred and eighteen cubic yards were removed the present fiscal year, making a total of 60,000 cubic yards under the contract, at 15¼ cents per cubic yard, scow measurement.

In the report for 1909, page 2105, an estimate of $39,150 was submitted to restore the project depths and widths between the mouth of the river and Maples road, the upper limits of the improvement.

The river and harbor act of June 25, 1910, provides that no part of the sum appropriated shall be expended at those points within the limits of the project where shoaling is due to caving banks until the banks shall have been protected by suitable docks or revetments constructed at the expense of the riparian interests. The $20,000 appropriated and $5,000 recommended for the year 1911 will restore the proper river section at the localities where property holders comply with these provisions.

A survey of the river made during June, 1910, showed a channel 21 feet deep from the river to Solvay tunnel, a distance of 1,500 feet; 14 feet from the Solvay tunnel to Wabash Railroad bridge, a distance of 14,000 feet, and from the Wabash Railroad bridge to Detroit, Monroe, and Toledo Railroad bridge, a distance of 1,100 feet, a 13-foot channel. The river shows but little change during the past year.

Original estimated cost of the work, 1887	$31,690.39
Whole amount expended to June 30, 1910	76,293.17

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

August 11, 1888	$10,000
September 19, 1890	10,000
July 13, 1892	11,690
August 18, 1894	5,000
June 3, 1896	5,000
March 3, 1899 (transferred from appropriation for constructing turning basin in Rouge River, Michigan)	5,000
June 13, 1902 (allotment of Sept. 8, 1902)	5,000
March 3, 1905 (allotment of May 12, 1905)	8,000
March 2, 1907 (allotment of Mar. 22, 1907)	7,000
March 3, 1909 (allotment of Apr. 9, 1909)	10,000
June 25, 1910	20,000
Total	96,690

CONTRACT IN FORCE.

Name of contractor: G. H. Breymann & Bro., Toledo, Ohio.
Character and amount of work: Dredging 60,000 cubic yards.
Price: 15½ cents per cubic yard, scow measurement.
Dated: May 1, 1909.
Emergency contract.
Date of beginning work: May 3, 1909.
Date of completion: July 7, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount in customary units.	Amount in short tons.	Valuation.
Cement	8,000 barrels	1,200	$12,000.00
Coal, soft	5,955 tons	5,955	14,887.50
Gravel	41,090 tons	41,090	24,654.00
Iron ore	159,871 tons	159,871	583,529.15
Iron pyrites	812 tons	812	5,684.00
Lath	2,801,400	840	9,803.50
Lumber	42,700,000 feet b. m.	64,051	939,400.00
Pulp wood	17,000 cords	34,000	136,000.00
Sand	12,136 yards	18,203	6,068.00
Soda ash	10,000 tons	10,000	180,000.00
Total		336,022	1,912,026.15

(c) HARBOR OF MONROE.

The project for the improvement of this harbor was practically completed in 1845.

Soundings were taken during the past fiscal year which show the channel in very good condition with the exception of a small stretch about 6,300 feet from the entrance.

The decking on the inner portion of the south pier is in poor condition and will soon have to be removed. The balance of the piers is in good condition.

APPROPRIATIONS.

February 24, 1835	$30,000.00
July 2, 1836	15,000.00
March 3, 1837	30,000.00
July 7, 1838	15,000.00
June 11, 1844	20,000.00
August 30, 1852	14,000.00
June 23, 1866	31,015.27
June 10, 1872	10,000.00
March 3, 1873	15,000.00
June 23, 1874	10,000.00
March 3, 1875	10,000.00
August 14, 1876	5,000.00
June 8, 1878	2,500.00
March 3, 1879	2,000.00
June 14, 1880	2,000.00
March 3, 1881	1,000.00
August 2, 1882	1,000.00
August 5, 1886	$2,000.00
August 11, 1888	5,000.00
September 19, 1890	5,000.00
July 13, 1892	10,000.00
August 18, 1894	5,000.00
June 3, 1896	5,000.00
March 3, 1899	5,000.00
June 13, 1902 (allotment of Sept. 12, 1902)	1,500.00
March 3, 1905 (allotment of May 12, 1905)	5,000.00
March 2, 1907 (allotment of Mar. 22, 1907)	4,000.00
June 25, 1910	1,000.00
Total	262,015.27

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Coal	150 tons	150	$820.50
Fish	649 tons	649	77,880.00
Sand	7,557 yards	11,335	3,778.50
Total		12,134	82,479.00

N N 13.

IMPROVEMENT OF BLACK RIVER AT PORT HURON, MICHIGAN.

The present approved project for the improvement of this river was completed in 1893.

A survey of the river from the mouth to Washington avenue was made during the month of May, 1910. The survey showed the river to have shoaled throughout its entire length, the greatest shoaling taking place above the Grand Trunk Railway bridge. A verbal agreement was made May 27, 1910, with Muir-O'Sullivan Dredge and Dock Company, of Port Huron, Mich., to do the proposed work at 20 cents per cubic yard, scow measurement.

The work was begun May 31, 1910, and completed June 11, 1910, a total of 7,500 cubic yards being removed. As a result of the dredging, the project depths were restored from the Grand Trunk Railway bridge to the Michigan Sulphite Company's dock.

Original estimate of cost of 16-foot channel, 1891	$75,000.00
Whole amount expended to June 30, 1910	56,819.56

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

September 19, 1890	$25,000
July 13, 1892	10,000
August 18, 1894	4,000
June 3, 1896	4,000
March 3, 1899	4,000
March 2, 1907	6,000
March 3, 1909 (allotment of Apr. 9, 1909)	4,000
June 25, 1910	5,000
Total	62,000

CONTRACT IN FORCE.

Name of contractor: Muir-O'Sullivan Dredge and Dock Company, Port Huron, Mich.

Character of work: Dredging 7,500 cubic yards.

Price: 20 cents per cubic yard, scow measurement.

Date of approval: Oral agreement.

Date of beginning work: May 31, 1910.

Date of completion: June 11, 1910.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS, 1909.

Season of navigation.—Opened March 14, 1909; closed December 28, 1909.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	39		39	13,040
Sailing	97		97	19,600
Unregistered:				
Steamers	[a] 370	[a] 185	555	[a] 1,010
Sailing	[a] 200		200	[a] 800
Total	706	185	891	34,450

[a] Estimated.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Brick	130,000	325	$1,300.00
Cedar posts	6,800	340	1,020.00
Coal, hard	10,000 tons	10,000	54,700.00
Coal, soft	39,831 tons	39,831	99,577.50
Cord wood	68 cords	122	340.00
Gravel	24,250 cubic yards	39,506	23,739.60
Lath	2,610,000	783	9,135.00
Lumber	6,253,000 feet b. m.	10,405	137,566.00
Pulp wood	6,000 cords	15,000	48,000.00
Shingles	7,000,000	1,750	24,500.00
Total		118,122	399,878.10

N N 14.

OPERATING AND CARE OF ST. CLAIR FLATS CANAL, MICHIGAN.

During the fiscal year the custodian, with assistant and labor party, has continued the routine work of enforcing rules, making necessary repairs, care of grounds and property, and keeping records.

The amount of commerce passing through the canal during the season of 1909 was 62,895,134 tons, having an estimated value of $679,896,399.

Summary of expenditures for operating and care of St. Clair Flats Canal, Michigan, for the fiscal year ending June 30, 1910.

Pay rolls, including supervision of canal, care of grounds, repairs to piers, etc	$2,713.03
Repair material and nonpersonal services	258.70
Contingencies	2,329.43
Total	5,301.16

Statement of expenditures for operating and care of St. Clair Flats Canal Michigan.

1882	$8,778.59	1898	$2,056.53
1883	5,118.47	1899	2,049.75
1884	3,090.65	1900	3,916.30
1885	4,274.16	1901	2,860.23
1886	10,171.54	1902	2,314.97
1887	1,819.53	1903	3,912.11
1888	1,510.00	1904	16,875.66
1889	20,070.00	1905	28,823.79
1890	2,403.16	1906	7,528.22
1891	1,845.20	1907	15,673.61
1892	1,866.67	1908	9,094.81
1893	2,697.93	1909	11,340.21
1894	3,586.18	1910	5,301.16
1895	1,999.32		
1896	2,288.49	Total	185,643.13
1897	2,375.89		

The above amounts represent the actual expenditures, and in no case include the outstanding liabilities, which for the fiscal year 1910 amount to nothing.

ST. CLAIR FLATS CANAL.

Total net registered tons	50,721,882
Actual freight	62,895,134

NN 15.

IMPROVEMENT OF CLINTON RIVER, MICHIGAN.

During November, 1909, soundings were taken in the river. They showed a shoaling at the entrance and for a short stretch opposite the Sprudel Water Company's property at Mount Clemens, the balance of the river being in fair condition.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $2,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Total amount appropriated previous to September 19, 1890, as given in House Document No. 421, Fifty-seventh Congress, second session	$41,500
September 19, 1890	10,000
July 13, 1892	8,564
August 18, 1894	5,000
June 3, 1896	10,000
March 3, 1905	3,000
March 2, 1907	2,500
June 25, 1910	5,000
Total	85,564

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Freight traffic.

Article.	Amount, in customary units.	Amount, in short tons.	Valuation.
Cedar posts	5,467	109	$820.05
Cement	100 barrels	15	150.00
Coal, hard	4,000 tons	4,000	21,880.00
Coal, soft	7,485 tons	7,485	18,712.50
Gravel	2,800 tons	2,800	1,680.00
Headings	25,500 sets	51	1,533.00
Hoops	312,000	6	3,120.00
Logs	408,000 cubic feet	8,568	48,960.00
Lumber	425,000 feet b. m.	743	9,350.00
Salt	1,575 barrels	225	1,181.25
Sand	1,317 yards	1,976	658.50
Staves	170,000	425	1,360.00
Total		26,402	109,405.30

N N 16.

IMPROVEMENT OF DETROIT RIVER, MICHIGAN.

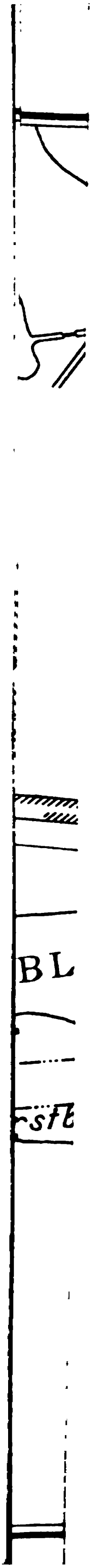
The work in progress on this river is that in accordance with plan A, the Amherstburg channel, authorized by the river and harbor acts of March 3, 1905, and March 2, 1907, which provides for a channel with at least 600 feet width and a depth of 21 feet below a Lake Erie stage of 571 (levels of 1903) feet, from Detroit to Lake Erie, and that in accordance with plan B, the Livingstone channel, authorized by the river and harbor act of March 2, 1907, which provides for a second channel at the mouth of the Detroit River to be 22 feet deep at the same stage, 300 feet wide from Grosse Isle to Bar Point and 800 feet thence to deep water in Lake Erie, as shown on the accompanying map.

AMHERSTBURG CHANNEL.

During the fiscal year work on this channel was prosecuted under two contracts and by hired labor, as follows:

Limekiln Crossing.—Under formal contract dated March 29, 1907, Dunbar & Sullivan Dredging Company began work on May 24, 1907, and continued operations until the completion of the contract on August 17, 1909. The work performed during the year consisted in the removal of a ridge of loose rock which had been thrown up during dredging operations along the east edge of the channel. There was removed under this contract limestone bed rock to the extent of 62,081 cubic yards full rate (above 22-foot grade), 75,902 cubic yards half rate (between 22 and 24 foot grades), and 52,325 cubic yards no payment (below 24-foot grade); and the amount earned by the contractors was $380,121.60.

Bar Point shoals.—Under formal contract dated August 5, 1909, G. H. Breymann & Bro. began work on August 5, 1909, and, except between December 7, 1909, and May 5, 1910, operations were continued until its completion on June 25, 1910. There was removed sand, clay, silt, bowlders, and hardpan to the extent of 444,892 cubic yards, scow measurement. Surveys are yet to be made to determine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the amount of material removed below 23 feet depth, and for this amount no payment is to be allowed.

Plant operated by hired labor.—A derrick scow with diving outfit belonging to the United States was operated by hired labor between July 1 and November 20, 1909, and between May 11 and June 30, 1910, removing bowlders from the channel along Hackett and Grosse Isle South Channel ranges. The area thus improved was 280,000 square yards, and 690 cubic yards of bowlders were removed at a cost of $6.21 per cubic yard.

The amount expended on this channel to June 30, 1910, was $3,975,124.22, none of which was applied to maintenance, and as a result of this expenditure there is a channel of 600 feet minimum width and 21 feet depth below a Lake Erie stage of 571, except at the following places: From 1 mile south of Fighting Island to the head of Limekiln Crossing there is a depth of but 19.2 feet; at the lower end of Limekiln Crossing section there is a ledge of bed rock 100 feet square in area where there is but 20 feet depth; and along Hackett range at about one-fourth mile south of Bois Blanc Island for a distance of about 500 feet and within 50 feet of the east channel line there are a number of ledges of bed rock where the least depth is 20.5 feet. From Detroit River light-house to deep water in Lake Erie, passing to the west of the light-house, the channel is completed for 400 feet width.

The improvement of that portion of the channel along Grosse Isle South Channel range north of the junction with Livingstone channel is contemplated at an early date, for which the river and harbor act of June 25, 1910, appropriated $560,000; but the improvement of the remaining portion of the Amherstburg channel is not contemplated until after the opening of Livingstone channel to navigation. For the latter work $375,000 can profitably be expended during the fiscal year ending June 30, 1912, and it will be applied to the completion of the improvement along Grosse Isle South channel, Limekiln Crossing, and Hackett ranges.

LIVINGSTONE CHANNEL.

Section 1.—Under formal contract dated October 31, 1907, Great Lakes Dredge and Dock Company began work on December 7, 1907, and operations were continued. The contractors constructed a cofferdam around the south 1,500 feet of this contract area in connection with a part of section 2, and the inclosed area was unwatered. This dam was completed on August 10, 1909, and material dredged from the channel was used in its construction to the extent of 214,340 cubic yards.

Subaqueous excavation.—There was removed limestone bed rock, bowlders, and clay to the extent of 31,957 cubic yards full rate (above 22-foot grade), 31,888 cubic yards half rate (between 22 and 24 foot grades), and 23,106 cubic yards no payment (below 24-foot grade). Drilling and blasting was done to the extent of 12,238 linear feet of holes drilled and 13,776 pounds of dynamite used.

Dry excavation.—There was removed limestone bed rock to the extent of 88,090 cubic yards full rate, 13,613 cubic yards half rate, and 1,613 cubic yards no payment. Drilling and blasting was done to the extent of 57,867 linear feet of holes drilled and 103,600 pounds of dynamite used. The side walls were channeled for 20,920 square feet. About 73 per cent of the work to be done in the dry has been performed.

The total amount of material removed to June 30, 1910, was 199,641 cubic yards full rate, 84,675 cubic yards half rate, and 45,827 cubic yards no payment; and the amount earned by the contractors was $479,117.43. About 80 per cent of the entire work under this contract has been performed.

Section 2.—Under formal contract dated November 1, 1907, Grant Smith & Co. and Locher began work on April 14, 1908, and operations were continued. The cofferdam surrounding 2,800 feet of channel length was completed on October 4, 1908; an adjacent area of 300 feet length at the extreme north end, together with a part of section 1, was surrounded by dams on August 10, 1909; and another adjacent area of 1,200 feet length to the south was surrounded by dams on September 4, 1909. The entire area inclosed by these dams has been unwatered. Material excavated from the channel was used in the construction of the dams to the extent of 218,500 cubic yards.

Dry excavation.—There was removed clay, sand, and bowlders, classified as "earth," to the extent of 28,023 cubic yards full rate (above 23-foot grade), limestone bed rock to the extent of 360,664 cubic yards full rate (above 23-foot grade), 24,236 cubic yards half rate (between 23 and 24 foot grades), and 4,809 cubic yards no payment (below 24-foot grade); also, limestone bed rock to the extent of 20,830 cubic yards full rate (above 22-foot grade), and 3,058 cubic yards half rate (between 22 and 24 foot grades). Drilling and blasting was done to the extent of 223,377 linear feet of holes drilled and 356,400 pounds of dynamite used. The side walls were channeled for 74,721 square feet.

Subaqueous excavation.—There was removed limestone bed rock to the extent of 474 cubic yards full rate (above 22-foot grade), 11,473 cubic yards half rate (between 22 and 24 foot grades), and 40,694 cubic yards, no payment (below 24-foot grade). Drilling and blasting was done to the extent of 64,103 linear feet of holes drilled and 67,279 pounds of dynamite used.

The total amount of material removed to June 30, 1910, was as follows: At dry prices, 29,428 cubic yards full rate of earth; and 666,104 cubic yards full rate, 28,265 cubic yards half rate, and 5,835 cubic yards no payment, of rock. At subaqueous prices, 341,558 cubic yards full rate, 31,379 cubic yards half rate, and 26,081 cubic yards no payment, of earth; and 92,264 cubic yards full rate, 22,878 cubic yards half rate, and 45,815 cubic yards no payment, of rock. The amount earned by the contractors was $1,453,088.76, and about 90 per cent of the work has been performed.

Section 3.—Under formal contract dated December 23, 1907, P. B. McNaughton and O. E. Dunbar began work on April 9, 1908, and, except between December 9, 1909, and March 31, 1910, operations were continued. There was removed clay, sand, bowlders, and hardpan, classified as "earth," to the extent of 356,760 cubic yards full rate (above 22-foot grade); also, limestone bed rock to the extent of 195,667 cubic yards full rate (above 22-foot grade), 56,284 cubic yards half rate (between 22 and 24 foot grades), and 56,630 cubic yards no payment (below 24-foot grade). Drilling and blasting was done to the extent of 942,277 linear feet of holes drilled and 1,749,485 pounds of dynamite used. The total amount of material removed to June 30, 1910, was 1,368,307 cubic yards full rate, 65,771 cubic yards half rate, and 31,232 cubic yards no payment, of earth; and 301,071 cubic yards full rate, 88,232 cubic yards half rate, and 77,142 cubic yards no payment, of rock. The amount earned by the contractors was $1,667,119.85, and about 65 per cent of the work has been performed.

Section 4.—Under formal contract dated July 24, 1907, G. H. Breymann & Bros. began work on July 17, 1907, and, except between December 6, 1909, and May 16, 1910, operations were continued until its completion on June 30, 1910. There was removed sand, clay, silt, bowlders, and hardpan to the extent of 506,437 cubic yards, scow measurement. The total removed was 4,424,818 cubic yards, of which amount 376,812 cubic yards were removed from below 24 feet depth, as shown by survey covering about 40 per cent of the contract area. The amount of material removed from below 24 feet depth within the remaining area is yet to be determined by surveys. Under this contract no payment is to be allowed for excavation below 24 feet depth.

There was expended on this channel to June 30, 1910, $4,205,559.61, none of which was applied to maintenance. As a result of the work done on Section 4 of this project there is in use a channel of 22 feet depth, 800 feet width, and about 24,000 feet length to deep water in Lake Erie, passing to the east of Detroit River light-house. The remaining portion of this channel is closed to navigation.

The river and harbor act of June 25, 1910, appropriated $630,000 for widening that portion of Livingstone channel inside the cofferdams from 300 feet to 450 feet. This improvement will commence at an early date.

Surveys.—The areas improved under existing contracts and by hired labor were examined from time to time by means of the sweeping plant as a means of inspection to determine that the required clear depths had been secured. Other portions of the channel were also examined to locate obstructions to navigation. The area thus surveyed was about 2,400,000 square yards, at a cost of $4,500.

At various times during the year soundings were taken from scow or boats, and through the ice during the winter, for the purpose of determining amounts of material removed and to be removed under existing contracts. The number of such soundings was 290,920, and the cost was $7,630, or 2.6 cents per sounding.

Also, at sections 1 and 2, Livingstone channel, surveys were made by the use of level to determine the amounts of rock and earth excavated by the dry method. The depths of excavation or "soundings" were taken at the corners of 10-foot squares to the number of 30,800, at a cost of $360, or 1.2 cents per sounding.

As the progress of the work required, stakes were driven and shore ranges established marking the limits of areas under improvement and of dumping grounds.

For the purpose of obtaining accurate data to determine the slope of the river under conditions existing since the construction of the dams at Sections 1 and 2, Livingstone channel, three self-registering water gauges were operated and daily inspected except during the winter months. These gauges were located near the Canadian shore, one just north of the upper dam, one at Limekiln Crossing, and the third nearly abreast of the south end of Bois Blanc Island. The last-mentioned gauge was operated during the entire year and from its record was obtained the stage of water at the mouth of Detroit River.

Tug service.—On account of plant operated by hired labor, tug service was necessary as follows: Between July 1 and December 10, 1909, by tug *Pallister*, 133½ days, at $24 per day, $3,204; between April 9 and June 30, 1910, by tug *John E. Monk*, 66 days, at $23 per day, $1,518. Also, such service was rendered by the gasoline launch *Don* owned and operated by the United States.

Accidents to vessels.—During the year there were but few accidents to vessels in Detroit River of a serious nature. During the latter part of the season of 1909, a number of vessels grounded to the east of the completed 400-foot channel through Bar Point shoals within the area then being improved. Also, during the same period, a number of vessels struck bowlders or other obstructions in the channel along Grosse Isle South Channel range. No serious damage was reported as a result of these groundings.

Water-gauge readings.—The record of the self-registering water gauge at the mouth of Detroit River during the year was as follows:

Month.	1. Mean stage.	2. Maximum stage.	3. Minimum stage.	4. Mean depth.	5. Maximum depth.	6. Minimum depth.
1909.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
July	573.22	574.24	571.80	21.42	22.44	20.00
August	573.11	573.95	572.00	21.31	22.15	20.20
September	572.64	573.59	570.87	20.84	21.79	19.07
October	571.94	573.49	569.81	20.14	21.69	18.01
November	571.87	573.03	568.91	20.07	21.23	17.11
December	571.72	573.71	568.35	19.92	21.91	16.55
1910.						
January	571.58	572.63	570.21	19.78	20.83	18.41
February	571.50	571.98	570.61	19.70	20.18	18.81
March	571.76	572.46	570.49	19.96	20.66	18.69
April	572.30	573.81	571.29	20.50	22.01	19.49
May	572.76	573.49	571.50	20.96	21.69	19.70
June	572.90	573.64	572.07	21.10	21.84	20.27

In the above table, columns 1, 2, and 3 give elevations above mean tide at New York, levels of 1903; and columns 4, 5, and 6 give depths at Ballards reef, this being the place of least depth in lower Detroit River, except for such up-bound vessels as kept to the eastward of the completed 400-foot channel at Bar Point shoals, between July 1 and September 30, 1909, and for this traffic 1 foot should be deducted from the depths given.

The highest stage of water during the year was 574.24 (22.44 feet depth) on July 3, 1909; the lowest stage was 568.35 (16.55 feet depth) on December 7, 1909; and the extreme yearly fluctuation was 5.89 feet. The month of greatest fluctuation was December, 1909 (5.36 feet), and the month of least fluctuation was February, 1910 (1.37 feet). The greatest fluctuations during short periods of time were as follows: 2.27 feet in 7 hours on July 3, 1909; 2.77 feet in 8 hours on October 11, 1909; 3.89 feet in 10 hours on December 5, 1909; 3.59 feet in 8 hours on December 6, 1909; 5.36 feet in 10 hours on December 7, 1909; and 2.40 feet in 8 hours on April 23, 1910.

The commerce passing through the Detroit River during the navigation season of 1909 amounted to 67,789,369 tons, as shown in the commercial statistics appended hereto.

GENERAL IMPROVEMENT.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $375,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

LIVINGSTONE CHANNEL.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $250,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

GENERAL IMPROVEMENT.

On past finished projects from 1874 to 1902, as indicated in House Document No. 421, Fifty-seventh Congress, second session	$2,054,500
March 3, 1903	450,000
March 3, 1905	500,000
June 30, 1906	700,000
March 2, 1907	150,000
May 27, 1908	150,000
June 25, 1910	560,000
	4,564,500
LIVINGSTONE CHANNEL.	
March 2, 1907	2,000,000
May 27, 1908	575,000
March 4, 1909	3,000,000
Sundry civil act June 25, 1910	600,000
River and harbor act June 25, 1910	630,000
	6,805,000
Aggregate of all appropriations	11,369,500

CONTRACTS IN FORCE.

AMHERSTBURG CHANNEL.

CONTRACT DATED MARCH 29, 1907.

Name of contractor: Dunbar & Sullivan Dredging Company, Buffalo, N. Y.

Amount and character of work: $380,121.60; dredging at Item B, Limekiln Crossing.

Price per unit: $3.80 per cubic yard, bank measurement.

Date of approval: April 19, 1907.

Date of beginning work: May 24, 1907.

Date of completion: August 17, 1909.

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[a] Exclusive of the balance unexpended July 1, 1910.

CONTRACT DATED AUGUST 5, 1909.

Name of contractor: G. H. Breymann & Bro., Toledo, Ohio.
Amount and character of work: $108,000 (estimated); dredging at Bar Point shoals.
Price per unit: 27 cents per cubic yard, scow measurement.
Date of approval: August 26, 1909.
Date of beginning work: August 5, 1909.
Date of completion: June, 1910.

EMERGENCY CONTRACT DATED MARCH 29, 1909.

Name of contractor: L. S. Sullivan, Toledo, Ohio.
Amount and character of work: $4,908; hire of tug *Pallister*.
Price per unit: $24 per day.
Date of beginning work: April 5, 1909.
Date of completion: December 10, 1909.

EMERGENCY CONTRACT DATED APRIL 30, 1910.

Name of contractor: Hackett & Mullen, Detroit, Mich.
Amount and character of work: $4,800 (estimated); hire of tug *John E. Monk*.
Price per unit: $23 per day.
Date of beginning work: April 9, 1910.
Date of expiration: About December 17, 1910.

LIVINGSTONE CHANNEL.

CONTRACT DATED OCTOBER 31, 1907.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Amount and character of work: $673,200; dredging at Section 1.
Price per unit: $1.98 per cubic yard, bank measurement.
Date of approval: December 19, 1907.
Date of beginning work: December 7, 1907.
Date of expiration: About May 31, 1911 (600 good working days).

CONTRACT DATED NOVEMBER 1, 1907.

Name of contractor: Grant Smith & Co. and Locher, Grosse Ile, Mich.
Amount and character of work: $1,578,440; rock and earth excavation at Section 2.
Price per unit: For cofferdam, $25,000; inside cofferdam, rock $1.24 per cubic yard, earth 60 cents per cubic yard; outside cofferdam, rock $3.40 per cubic yard, earth 60 cents per cubic yard; removal of pier, $5,000.
Date of approval: December 23, 1907.
Date of beginning work: April 14, 1908.
Date of expiration: About November 30, 1911 (750 good working days).

CONTRACT DATED DECEMBER 23, 1907.

Name of contractor: P. B. McNaughton and O. E. Dunbar, Buffalo, N. Y.
Amount and character of work: $2,700,750; rock and earth excavation at Section 3.
Price per unit: 50 cents per cubic yard, bank measurement, for earth, and $2.80 per cubic yard, bank measurement, for rock.
Date of approval: January 8, 1908.
Date of beginning work: April 9, 1908.
Date of expiration: About November 30, 1911 (750 good working days).

CONTRACT DATED JULY 24, 1907.

Name of contractor: G. H. Breymann & Bro., Toledo, Ohio.
Amount and character of work: $892,500; dredging at Section 4.
Price per unit: 25½ cents per cubic yard, scow measurement.
Date of approval: August 30, 1907.
Date of beginning work: July 17, 1907.
Date of expiration: About November 30, 1910 (500 good working days).

COMMERCIAL STATISTICS.

STATISTICS OF LAKE COMMERCE PASSING THROUGH THE DETROIT RIVER, MICHIGAN, DURING SEASON OF 1909.

[Compiled from official records at Detroit, Mich.]

SOURCE OF INFORMATION FOR TRAFFIC DATA AND VALUATION.

The number and class of vessels and the number of passages have been taken from the custom-house and post-office records at Detroit. The registered tonnage is taken from the American and Canadian "blue books." The determination of the actual freight carried is based upon the assumption that the ratio between the actual freight and registered tonnage is the same for Detroit River that it is for St. Marys Falls Canal. The valuation of the freight is based upon the assumption that the value of the freight passing the Detroit River is the same per ton as that passing St. Marys Falls Canal. The valuation of vessels as found in Lloyd's Register was used and all others estimated.

The commerce of the Detroit River during the past eight years exceeds that of the St. Marys Falls Canal by about 26 per cent.

The following compilation has been made from data similar to those used since 1902, viz, the marine post-office record of vessels passing through the Detroit River and the custom-house record of vessels stopping at Detroit. The Detroit postmaster, Mr. Homer Warren, has permitted the record of vessels passing Detroit River to be copied, while the record of those stopping was obtained from the collectors of customs at Detroit, Windsor, and Amherstburg. After the lists were completed the net registered tonnage was copied from the American and Canadian "blue books" and summed. The ferryboats plying between Detroit, Windsor, and Belle Isle and the dredging plants at Amherstburg and Detroit are not included.

The passages are collected and summed as follows:

Month.	Number of vessels.	Registered tonnage.	Month.	Number of vessels.	Registered tonnage.
January	29	6,506	August	4,774	8,361,654
February	37	6,202	September	4,599	8,319,031
March	136	27,815	October	4,340	8,477,227
April	1,215	955,309	November	3,666	7,223,764
May	3,265	4,671,345	December	1,077	1,819,559
June	4,164	6,728,197			
July	4,994	8,072,237	Total	32,296	54,668,846

The actual freight is obtained by comparison with the tonnage of St. Marys Falls Canal, where records of both net registered and actual freight are kept. During the season of 1909 the actual freight passing St. Marys Falls Canal was 21 per cent greater than the net registered tonnage. Assuming this ratio for the commerce of Detroit River, the actual freight would be 67,789,369 tons of 2,000 pounds each. The commerce using the St. Clair Flats Canal is less than that of the Detroit River. It is found from the custom-house records that 3,946,964 net registered tons that used the Detroit River do not go through the canal, but turn around and go back down the river. This should be subtracted from the Detroit River tonnage.

There is a small amount of business done at Lake St. Clair ports which does not go through the Detroit River, of which we have no actual record, but which is estimated by the custodian to aggregate 15,000 net registered tons during the season. This should be added to the Detroit River tonnage. Making the corrections, the commerce using the St. Clair Flats Canal during the season of 1909 is found to be 50,721,882 net registered tons, or 62,895,134 actual freight tons. The value of the freight passing St. Marys Falls Canal during the season of 1909 was found to be $10.81 per ton. Assuming this unit value of the Detroit River commerce, then the total value of actual freight passing Detroit River during the season of 1909 would be $732,803,079. The commerce passing Detroit

River has now been determined with accuracy for eight consecutive years as follows:

Year.	Number of passages.	Net registered tons.	Freight tons (estimated).	Value (estimated).
1902	33,000	39,828,680	44,260,506	$440,834,640
1903	33,112	37,453,796	46,817,245	471,917,830
1904	29,472	33,040,984	42,792,326	453,596,656
1905	35,599	45,912,622	55,508,360	522,888,751
1906	35,128	50,673,897	63,808,571	662,971,053
1907	34,149	53,959,769	71,226,896	697,311,302
1908	27,883	40,628,850	54,086,750	614,426,490
1909	32,296	54,668,846	67,789,369	732,803,079

The number of vessel passages has increased 4,413. There were 958 steam vessels that used the Detroit River during the season of 1909; of these there were 826 the registered tonnage of which exceeded 100 tons. The average tonnage of these 826 large steam vessels was 2,177 net registered tons. There were 821 sail vessels having a tonnage greater than 100 tons. Their average tonnage was 681 tons.

A comparison of the results of this year with last year shows that the net registered tonnage is 14,039,996 tons greater. The average registered tonnage per vessel of the season of 1909 is 1,693 tons.

N N 17.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION, INDEFINITE.

Wreck of steamer Eliza H. Strong.—In October, 1904, the *Eliza H. Strong* was wrecked in Lake Huron, 4,433 feet from the southeast corner of the dock at Lexington, Mich. In 1905 the Reid Wrecking Company, of Port Huron, took a contract from the underwriters to remove the wreck and machinery. The machinery was removed, but the wreck left untouched.

During the month of June, 1909, the wreck was removed by the United States, so as to leave a clear depth of 19.5 feet, Lake Huron stage 581.1. It required 1,350 pounds of dynamite to lower the wreck to grade.

Expenditures during the fiscal year were $748.16, in addition to $156.46 previously expended, making the total cost of the work $904.62.

Wreck of schooner Harvey Bissell.—On April 21, 1909, the steamer *Emma E. Thompson*, while leaving the dock at Alpena, Mich., struck the wreck of the schooner *Harvey Bissell*, losing her propeller wheel and receiving other damage. Upon examination it was found that the wreck lay on a sand bottom in about 18 feet of water and about 100 feet direct south from the end of Minor's dock at Alpena; that it was broken up so that there was little left except the bottom and fragments of the sides, and that the shoalest water found over the wreck was 12½ feet.

As the wreck lay in the way of and was a menace to vessels trading to the Minor dock, its removal was deemed necessary and an allotment of $1,000 was made for this purpose on May 3, 1909. The work of removal was accomplished during July, 1909, by the U. S. S. *Hancock's* crew and diver, at a cost of $665.56.

Wreck of steamer Iron Age.—On June 4, 1909, the steamer *Iron Age* burned in Lake Erie and sunk in about 25 feet of water. The wreck lay S. 8° 9′ E., 19,850 feet from the Detroit River light-house. The after end of the steamer was burned to the water's edge, and the upper works forward were washed away. The wreck was a menace to navigation, and on June 25, 1909, $6,000 was allotted for its removal. The work was completed by M. Sullivan, of Buffalo, N. Y., on September 2, 1909, under oral agreement for $3,500.

Wreck of schooner John Schuette.—This schooner was sunk in collision with the steamer *Alfred Mitchell* on July 2, 1909, directly on the sailing line in the channel of the Detroit River, below Rouge River, opposite the Great Lakes Engineering Works plant. An allotment of $1,000 was made on July 27, 1909, for the removal, and an additional allotment of $8.65 was authorized for expenses of lighting the wreck. The work of removal was completed by hired labor during the month of August, 1909, at a cost of $344.34.

Wreck of tug Louise.—The *Louise* was a wooden tug, 44 feet long and 12 feet wide, and had been lying sunk for the past few years in the Detroit River. In May, 1909, the tug was pumped out and towed to the River Rouge, where the machinery was removed by John Brokate, of Sandusky, Ohio. After the removal of the machinery Mr. Brokate gave the hull to H. Cheff and W. Huntsman, of Delray, Mich. They employed N. A. Larabell to tow the tug up the river. While doing this Mr. Larabell noticed she was filling with water and ran her on the bottom.

As the wreck was a menace to navigation, an allotment of $200 was made for its removal on September 10, 1909.

The wreck was removed by Geo. Brokate, of Toledo, Ohio, during the month of October, 1909, without cost to the United States.

Wreck in Saginaw River.—While the work of improving Saginaw River was in progress an obstruction was struck by several vessels, including the U. S. steamer *Hancock*, in the main channel. The obstruction was a serious menace to navigation. Advantage was taken of the contractor's plant, which was working in the vicinity, and its removal was effected, at a cost of $220.

Steamer Oscar T. Flint.—On November 25, 1909, this steamer, while lying at anchor in Thunder Bay, Lake Huron, about 4⅜ miles from the light-house, caught fire and sank in 33 feet of water. At time of sinking the vessel was loaded with Kelly Island limestone and salt. As the wreck was a serious menace to navigation, its removal was authorized, and an allotment of $1,500 was made on March 12, 1910, for the work. An additional allotment of $200 was made on May 5, 1910. Bids were opened on April 12, 1910, the lowest bidder being W. B. Sphear, of Sault Ste. Marie, Mich., who offered to remove the wreck for $1,600.

The successful bidder failing to sign the contract papers, the work of removal was undertaken by the U. S. steamer *Hancock* and crew, assisted by Wm. McCullough, of Port Huron, Mich., who furnished diving plant and wrecking schooner and agreed to assist the United States in the work, provided he was allowed the engines and boilers of the vessel. It is expected that the removal will be completed early in July. The expenditures during the fiscal year amounted to $77.50 and outstanding liabilities $35.

Schooner Maria Martin.—For many years this vessel has been a decided menace to navigation in the Detroit River. For a long time she was anchored in the path of the Belle Isle ferries, and was very dangerous to small craft. Later she twice dragged her anchor, the first time colliding with and damaging the Belle Isle Bridge and the second time grounding on shoal off the foot of Belle Isle.

The matter having been referred to this office by the United States district attorney, allotments of $350 and $50 were made on May 16 and June 20, 1910, for the work of removal.

Contract was entered into with David M. Hackett, of Detroit, Mich., on June 17, 1910, who completed the work on June 17, for the sum of $400.

There were no expenditures during the fiscal year.

Steamer John B. Ketcham, 2d.—On May 21, 1910, this steamer, attempting to enter the West Neebish rock cut in a fog, struck the light crib of light No. 14½. A hole was stove in her starboard side and she swung around and sank in the channel just below the upper dam, and in such position as to leave about 50 feet width at each end of her, thus closing the West Neebish channel to navigation and forcing all traffic to use the Middle Neebish channel.

The accident was reported immediately to the department and authority was granted by the Secretary of War to take possession of the vessel, and an allotment of $1,000 was made on May 21.

The deck load of pulp wood was thrown overboard and an attempt made with tugs to swing the vessel, but this was unsuccessful. The wrecking tug *Favorite* was ordered to proceed from Port Huron, Mich., to the site of the wreck, but this order was countermanded at Detour, Mich., by the owners. The Reid Wrecking Company, of Sarnia, Ontario, was thereupon engaged to send two pontons, and on June 4 the wrecking company succeeded in swinging the vessel so as to leave a channel of 165 feet for the passage of commerce.

The wreck was thereupon turned over to the owner, Mr. H. N. Loud, of Au Sable, Mich., who completed the work of raising the vessel.

The bill of expense for swinging the vessel has been sent to the owners for payment.

Expenditures during the fiscal year amounted to $51.93.

APPENDIX O O.

IMPROVEMENT OF RIVERS AND HARBORS IN THE CLEVELAND, OHIO, DISTRICT.

REPORT OF COL. JOHN MILLIS, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Toledo Harbor, Ohio.
2. Port Clinton Harbor, Ohio.
3. Sandusky Harbor, Ohio.
4. Huron Harbor. Ohio.
5. Vermilion Harbor, Ohio.
6. Lorain Harbor, Ohio.
7. Cleveland Harbor, Ohio.
8. Fairport Harbor, Ohio.
9. Ashtabula Harbor, Ohio.
10. Conneaut Harbor, Ohio.
11. Removing sunken vessels or craft obstructing or endangering navigation.

United States Engineer Office,
Cleveland, Ohio, July 23, 1910.

Sir: I have the honor to forward herewith annual reports for works in my charge for fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

John Millis,
Colonel, Corps of Engineers.

The Chief of Engineers, U. S. Army.

O O 1.

IMPROVEMENT OF TOLEDO HARBOR, OHIO.

For an account of early history and projects of improvements, see pages 2614 to 2616, Report of Chief of Engineers, 1898, and for latest projects, see pages 3020 and 3021, Report of Chief of Engineers, 1899.

For a statement and estimate of cost of the project of 1899 and maps showing the limits of " divisions " into which the work is separated, see Report of Chief of Engineers, 1898, pages 2693 to 2705. An accurate map of the harbor of Toledo was published in the Report of Chief of Engineers, 1901.

The channel depth was maintained by the dredging plant owned by the United States, the dredge *Burton* worked from July 1 to August 9, and from October 16 to December 1, and removed 32,580 cubic yards of material from Maumee River and 85,839 cubic yards of material from the outer division of the straight channel through Maumee Bay, all at a field cost of $7,692.22.

The rebuilding of the U. S. dredge *Maumee* was completed at Toledo on August 19.

There has been slight deterioration of the dike at the range lights. The amount now available is sufficient to make needed repairs.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $75,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Prior to March 3, 1899	[b] $1,629,200.00
March 3, 1899	150,000.00
June 6, 1900	132,500.00
March 3, 1901	8,000.00
June 13, 1902	15,000.00
June 28, 1902	223,000.00
March 3, 1903	190,000.00
April 28, 1904	70,000.00
March 3, 1905	20,000.00
March 3, 1905	161,000.00
Receipts from sales	$2,110.00
March 20, 1909 (allotment act March 3, 1909)	45,000.00
June 25, 1910	145,000.00
Total	2,790,810.00
Expended to June 30, 1910	2,617,157.34
Balance	173,652.66

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Toledo, Ohio, were compiled under the direction of this office, from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	1,506,951	Coal:	
Sand and gravel	281,734	Cargo	3,155,161
Grain	43,854	Bunker	144,369
Lumber	40,911	Sand	13,195
Salt	28,001	Crude oil	2,974
Coal, hard	11,073	Lumber	10,425
Copper ore	4,420	Miscellaneous	17,701
Fish	1,436		
Miscellaneous	22,510		
Total	1,940,890	Total	3,343,825

Total freight tonnage:	
1909	5,284,715
1908	3,994,246
Increase	1,290,469
Estimated value of freight for 1909	$16,662,325

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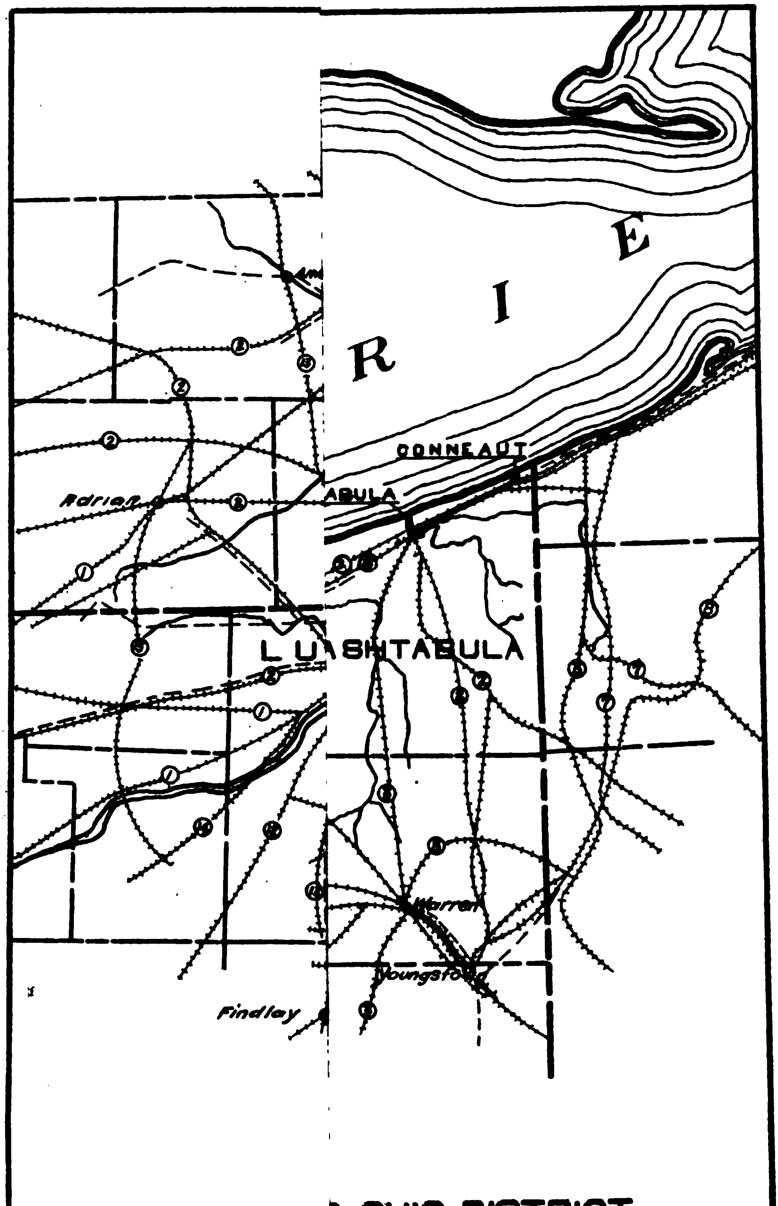
[a] Exclusive of the balance unexpended July 1, 1910.

[b] House Document No. 421, Fifty-seventh Congress, second session, page 307.



) OHIO DISTRICT

TH· SHORE OF LAKE ERIE
TO CONNEAUT
Report June 30 1910
le of Miles

1. Wabash R.R.
2. N.Y. Central Lines
3. Penna Lines
4. B.& O. R.R.
5. W & L.E. R.R.
6. N.Y. C. & St.L. R.R
7. B & L.E R.R.
8. Erie R.R.

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

Eng 61 3

Vessels.	Number.	Tonnage.
Entering	3,155	2,816,041
Departing	3,153	2,774,933
Built	2	4,546

Total registered tonnage—vessels entering and departing:

1909	5,590,974
1908	4,447,590
Increase	1,143,384

No new vessel lines established during the year.

O O 2.

IMPROVEMENT OF PORT CLINTON HARBOR, OHIO.

The location and early history of this work are given upon pages 2647 and 2648, Report of Chief of Engineers, 1898.

No work at Port Clinton Harbor has been done during the year.

United States property has been stored on the land owned by the United States at this harbor.

In accordance with the river and harbor act of March 3, 1909, a survey of Port Clinton Harbor was made during the year, the report of which is contained in House Document No. 815, Sixty-first Congress, second session.

There has been slight deterioration of the piers. The amount now available is sufficient to make needed repairs.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to August 18, 1894 [b]	$74,000.00
August 18, 1894	6,000.00
June 3, 1896	6,000.00
March 3, 1899	6,000.00
June 13, 1902	5,000.00
March 3, 1905	2,000.00
March 2, 1907	3,000.00
March 20, 1909 (allotment, act Mar. 3, 1909)	2,500.00
June 25, 1910	1,000.00
Total	105,500.00
Expended to June 30, 1910	102,611.34
Balance	2,888.66

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] House Document No. 421, Fifty-seventh Congress, second session, page 306.

COMMERCIAL STATISTICS.

The following statistics for the year 1909 relative to the commerce of the harbor of Port Clinton, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Lumber	4,321	Miscellaneous	116
Fish	3,287		
Miscellaneous	450		
Total	8,058	Total	116

Total freight tonnage:	
1909	8,174
1908	13,068
Decrease	4,894
Estimated value of freight for 1909	$243,185

Vessels.	Number.	Tonnage.
Entering	479	17,055
Departing	478	16,864

Total registered tonnage—vessels entering and departing:	
1909	33,919
1908	10,212
Increase	23,707

No new vessel lines established during the year.

OO 3.

IMPROVEMENT OF SANDUSKY HARBOR, OHIO.

A description of location and various projects of improvement, with results obtained, is given upon page 2650, Report of Chief of Engineers, 1898.

A contract dated July 15, 1907, with the Great Lakes Dredge and Dock Company of Chicago, Ill., for the removal of bed rock and overlying materials in the east and west dock channels was completed September 18.

The following table shows in detail the quantities and cost of work done during the fiscal year 1910, and the totals under the contract:

	Contract price.	Fiscal year, 1910.		Total to date.	
		Quantity.	Cost.	Quantity.	Cost.
West Dock channel:					
Bed rock drilled and blasted or otherwise broken up ... per cubic yard	$2.50			3,940.3	$9,850.75
Bed rock and overlying material removed, per cubic yard	.65	264	$171.60	65,647.0	42,670.55
East Dock channel:					
Bed rock drilled and blasted or otherwise broken up ... per cubic yard	2.50			10,299.2	25,748.00
Bed rock and overlying materials removed, per cubic yard	.65	695	451.75	42,780.0	27,807.00
Board of inspectors per day per man	.75	121	90.75	1,752.0	1,314.00
Total			714.10		107,390.30

The U. S. dredge *Burton* was engaged in maintenance dredging August 9 to 25, September 8 to 29, and June 8 to 30; 5,882 cubic yards of material was so removed from the outer channel and 103,377 cubic yards of material from the straight and dock channels, all at a field cost of $5,703.50.

The U. S. dredge *Maumee* worked in the dock channel from August 23 to September 21, 1909, removing 8,855 cubic yards of material, and from June 2 to June 30, 1910, was employed in shaping up a length of 2,030 feet of the east jetty extension where rock had previously been deposited. The field cost of this work was $4,436.28.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to March 3, 1899	[b] $477,192.00
March 3, 1899	80,000.00
June 13, 1902	125,000.00
June 28, 1904 (allotment act of Apr. 28, 1904)	10,000.00
March 3, 1905	125,000.00
June 30, 1906	175,000.00
March 2, 1907	125,000.00
March 4, 1907	$175,000.00
June 25, 1910	5,000.00
Total	1,297,192.00
Expended to June 30, 1910	1,120,730.73
Balance	176,461.27

CONTRACT IN FORCE.

Name of contractor: The Great Lakes Dredge and Dock Company, Chicago, Ill.

Date of contract: July 15, 1907.

Date of approval: July 26, 1907.

Date of commencement: August 19, 1907.

Date of completion: January 29, 1908.

Extended for a reasonable period.

Completed September 18, 1909.

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Sandusky, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	12,419	Coal:	
Sand	223,870	Cargo	1,189,331
Stone	29,100	Bunker	63,200
Lumber	20,722	Sand	7,800
Grain	15,200	Miscellaneous	11,849
Fish	3,255		
Miscellaneous	10,200		
Total	314,766	Total	1,272,180

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] House Document No. 421, Fifty-seventh Congress, second session, page 306.

Total freight tonnage:

1909	1,586,946
1908	1,295,474
Increase	291,472
Estimated value of freight for 1909	$4,995,551

Vessels.	Number.	Tonnage.
Entering	2,739	1,103,182
Departing	2,742	1,097,683

Total registered tonnage—vessels entering and departing:

1909	2,200,865
1908	2,076,233
Increase	124,632

No new vessel lines established during the year.

OO 4.

IMPROVEMENT OF HURON HARBOR, OHIO.

A description of the early conditions of the harbor at the mouth of Huron River and of the projects for its improvement is given on pages 2653 and 2654, Report of Chief of Engineers, 1898.

The present project is given in full in the Report of Chief of Engineers, 1904, pages 3209 to 3218, inclusive.

All of the work provided for has been completed except a small amount of dredging in the outer harbor.

The U. S. dredge *Burton* restored the depth and width of the entrance channel September 30 to October 15; 14,142 cubic yards of material was so removed at a field cost of $1,402.62.

There has been slight deterioration of the piers. The amount now available is sufficient to make necessary repairs. Erosion of the shore has caused a break between the inner end of the west pier and the shore line, but this is not as yet materially detrimental to the harbor. Suit has been brought against the United States by the owner of the shore property adjacent to the pier. Restoring connection of the pier with the shore will not be recommended till the settlement of this suit.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $2,500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Prior to December 31, 1902[a]	$237,273.71
May 31, 1904 (allotment act Apr. 28, 1904)	40,000.00
March 3, 1905	68,500.00
Receipts from sales	26.67
June 30, 1906	150,000.00
March 2, 1907	16,000.00
March 4, 1907	47,000.00
June 25, 1910	3,000.00
Total	561,800.38
Expended to June 30, 1910	521,323.06
Balance	40,477.32

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Huron, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	272,251	Coal:	
Fish	497	Cargo	582,485
Miscellaneous	270	Bunker	25,603
Total	273,018	Total	608,088

Total freight tonnage:

1909	881,106
1908	1,167,574
Decrease	286,468

Estimated value of freight for 1909 $2,310,306

Vessels.	Number.	Tonnage.
Entering	222	462,150
Departing	224	462,175

Total registered tonnage—vessels entering and departing:

1909	924,325
1908	1,270,340
Decrease	346,015

No new vessel lines established during the year.

O O 5.

IMPROVEMENT OF VERMILION HARBOR, OHIO.

For a description and history of this improvement, see page 2696, Report of Chief of Engineers, 1898.

No work has been done at Vermilion Harbor during the year.

There has been slight deterioration of the piers. The amount available is sufficient to make necessary repairs.

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[a] House Document No. 421, Fifty-seventh Congress, second session, page 305.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $500

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to June 30, 1902 [b]	$133,277.55
March 3, 1905	15,000.00
March 2, 1907	15,000.00
March 20, 1909 (allotment, act Mar. 3, 1909)	2,000.00
June 25, 1910	1,000.00
Total	166,277.55
Expended to June 30, 1910	163,250.42
Balance	3,027.13

COMMERCIAL STATISTICS.

The following statistics for the year 1909 relative to the commerce of the harbor of Vermilion, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.
Fish	1,345
Ice	920
Total	2,265

Total freight tonnage:	
1909	2,265
1908	1,355
Increase	910
Estimated value of freight for 1909	$136,410

Vessels.	Number.	Tonnage.
Entering	22	1,080
Departing	25	1,112

Total registered tonnage—vessels entering and departing:	
1909	2,192
1908	1,068
Increase	1,124

No new vessel lines established during the year.

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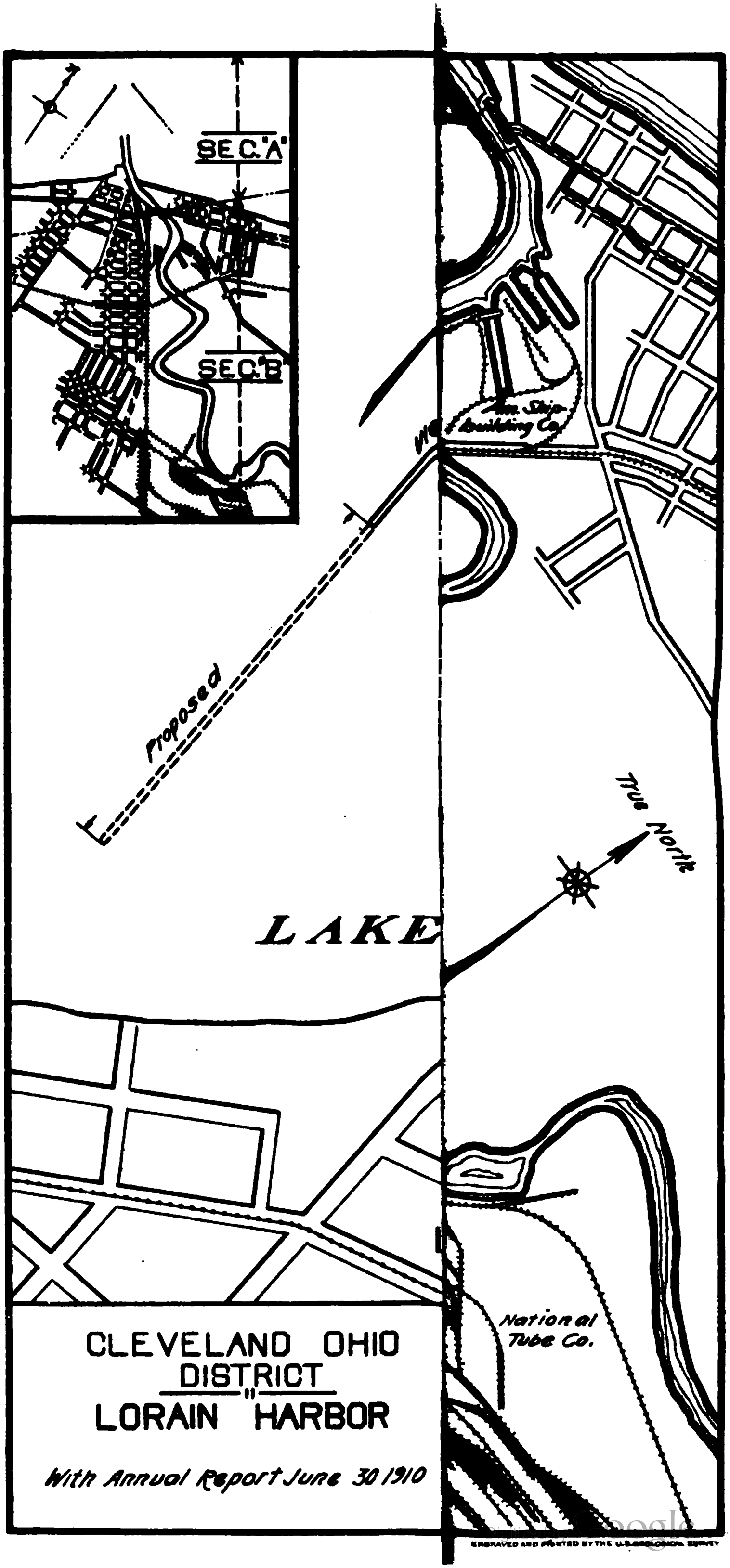
[a] Exclusive of the balance unexpended July 1, 1910.

[b] House Document No. 421, Fifty-seventh Congress, second session, page 307.



CLEVELAND OHIO
DISTRICT
LORAIN HARBOR

With Annual Report June 30 1910

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

O O 6.

IMPROVEMENT OF LORAIN HARBOR, OHIO.

A description of the location, conditions, and projects for improvement of this harbor is given on pages 2658 and 2718 to 2728, Report of Chief of Engineers, 1898, and on page 751, Report of Chief of Engineers, 1908.

The work of extending the west breakwater toward shore was deferred, awaiting action by the city to extend the water-works intake so it would be outside the proposed breakwater extension.

The U. S. dredge *Burton* was engaged August 26 to September 7, 1909, and May 21 to June 7, 1910, in dredging necessary to maintenance of entrance channel. Nineteen thousand three hundred and seventy-nine cubic yards of material was so removed at a field cost of $3,049.22.

In accordance with provisions of the river and harbor act of March 3, 1909, a survey of the harbor was made, the report of which is contained in House Document No. 644, Sixty-first Congress, second session.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $5,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

Prior to March 3, 1899 [b]	$292,204.77	Received from other sources	$79.60
March 3, 1899	50,000.00	June 25, 1910	150,000.00
June 6, 1900	125,000.00	Total	1,213,284.37
June 13, 1902	6,000.00	Expended to June 30, 1910	950,004.01
June 28, 1902	300,000.00	Balance	263,280.36
March 3, 1903	9,000.00		
April 28, 1904	100,000.00		
March 3, 1905	105,000.00		
June 30, 1906	46,000.00		
March 2, 1907	30,000.00		

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Lorain, Ohio, were compiled under the direction of this office, from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	3,124,656	Coal:	
Lumber	8,910	Cargo	1,953,998
Sand	8,491	Bunker	121,913
Fish	1,661	Miscellaneous	413
Miscellaneous	375		
Total	3,144,093	Total	2,076,324

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] House Document No. 421, Fifty-seventh Congress, second session, page 304.

Total freight tonnage:	
1909	5,220,427
1908	4,399,350
Increase	821,077
Estimated value of freight for 1909	$17,490,400

Vessels.	Number.	Tonnage.
Entering	804	2,495,124
Departing	764	2,336,972
Built	12	52,557

Total registered tonnage—vessels entering and departing:	
1909	4,939,967
1908	4,014,558
Increase	925,409

No new vessel lines established during the year.

OO 7.

IMPROVEMENT OF CLEVELAND HARBOR, OHIO.

For a history of the early conditions and projects of improvements, see pages 2661–2662, Report of the Chief of Engineers for 1898, and pages 530 and 531, Report of the Chief of Engineers for 1899.

The work of improving and enlarging Cleveland Harbor by extending the main breakwater eastward is being done under a contract dated November 20, 1902, with Hughes Brothers & Bangs, by The Breakwater Company, as successors of the original contractors, for the eastern division, and under a contract dated January 14, 1909, with The Breakwater Company, for the further extension.

The following is a tabular statement of the work done under these contracts:

	Contract price.	Fiscal year 1910.		Total to date.	
		Quantity.	Cost.	Quantity.	Cost.
Rubble mound breakwater (western division) and pierhead, completed prior to present fiscal year					$901,079.84
Rubble mound breakwater (eastern division):					
Large riprap stone ... tons	$1.30			122,628.1	159,416.53
Small riprap stone ... do	1.14			55,564.9	63,343.99
Quarry run stone ... do	1.083			7,965.9	8,627.07
Quarry run stone ... do	1.30	81,213.1	$105,577.03	360,904.9	469,176.37
Core filling shale ... cubic yards	.70			106,721.2	74,704.84
Core filling sand ... do	.40			98,964.4	39,555.76
Total			105,577.03		1,715,934.40
Rubble mound breakwater (new extension), quarry run stone ... tons	.94	200,514.3	188,483.46	347,172.3	326,341.99
Grand total			294,060.49		2,042,276.39

The cost of the work done under these contracts during the year, including inspection and contingencies, was $307,650.20.

The western division is completed, the eastern division is 95.4 per cent completed, and the further extension is 42.1 per cent completed.

Work under a contract with the Great Lakes Dredge and Dock Company, dated July 12, 1909, for dredging to a depth of 25 feet below mean lake level over area in the east basin and necessary dredging to remove shoaling in west basin and entrance channel was completed November 30.

The following statement shows the work done under this contract:

	Contract price.	Fiscal year 1910.		Total of contract.	
		Quantity.	Cost.	Quantity.	Cost.
Dredging....................cubic yards..	$0.17	232,803	$39,576.51	232,803	$39,576.51
Logging..............................hours..	....	....	140.69	....	140.69
Board of inspectors, per day, per man.......	.75	356⅔	267.50	356⅔	267.50
Total....................................	....	....	39,984.70	....	39,984.70

The cost of the work done under this contract during the year, including inspection and contingencies, was $42,642.73.

The construction of a wharf at the foot of East Ninth street under a contract dated November 21, 1908, and supplemental agreements dated August 18 and November 2, 1909, was completed November 27, 1909. The contract price for this work was $83,735, but this was increased to $84,628.15 by the supplemental agreement dated November 2, 1909.

The cost of the work done under this contract during the year, including inspection and contingencies, was $84,968.75. The storehouse contemplated by the approved plans has not yet been built.

The U. S. dredge *Maumee* was engaged from December 1 to 11 in removing a shoal near the foot of East Ninth street, and 2,290 cubic yards of material was so removed, at a field cost of $436.96.

Dredge *Maumee* and other government plant was laid up for the winter at this harbor and customary repairs were made.

In my opinion, this harbor is worthy of further improvement. This assumes that a plan is to be adopted by cooperation with the local interests which will insure the utilization for public commercial purposes of the harbor front and the harbor basin now being formed by constructing the east breakwater extension.

CLEVELAND BREAKWATER EXTENSION (AUTHORIZATION OF 1907).

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement..	[a] $200,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

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[a] Exclusive of the balance unexpended July 1, 1910.

APPROPRIATIONS.

Prior to March 3, 1875	[a] $346,244.84
March 3, 1875	50,000.00
August 14, 1876	58,000.00
June 18, 1878	100,000.00
March 3, 1879	100,000.00
June 14, 1880	125,000.00
March 3, 1881	200,000.00
August 2, 1882	175,000.00
July 5, 1884	100,000.00
August 5, 1886	93,750.00
August 11, 1888	100,000.00
September 19, 1890	75,000.00
July 13, 1892	100,000.00
August 18, 1894	50,000.00
June 3, 1896	80,000.00
June 4, 1897	350,000.00
July 1, 1898	294,056.52
March 3, 1899	175,000.00
June 6, 1900	175,000.00
June 13, 1902	$625,000.00
June 28, 1902	107,000.00
March 3, 1903	227,500.00
April 28, 1904	485,200.00
March 3, 1905	830,800.00
June 30, 1906	350,000.00
Received from other sources	615.41
March 2, 1907	223,000.00
March 4, 1907	200,000.00
May 27, 1908	475,000.00
March 4, 1909	337,500.00
June 25, 1910	616,000.00
Total	7,224,666.77
Expended to June 30, 1910	6,309,076.62
Balance	915,590.15

CONTRACTS IN FORCE.

CONTRACTS FOR IMPROVEMENT AND ENLARGEMENT OF CLEVELAND HARBOR, OHIO.

Name of contractor: Hughes Brothers & Bangs, Syracuse, N. Y.
Date of contracts: November 20, 1902.
Date of approval: December 30, 1902.
Date of commencement: May 1, 1903.
Date of completion: December 31, 1908.

CONTRACT FOR CONSTRUCTING WHARF AT CLEVELAND HARBOR, OHIO.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Date of contract: November 21, 1908.
Date of approval: December 9, 1908.
Date of commencement: December 14, 1908.
Date of completion: June 30, 1909.
Extended: Time limit waived for a reasonable period.
Completed: November 27, 1909.

CONTRACT FOR FURTHER EXTENSION OF EAST BREAKWATER.

Name of contractor: The Breakwater Company, Cleveland, Ohio.
Date of contract: January 14, 1909.
Date of approval: February 18, 1909.
Date of commencement: April 21, 1909.
Date of completion: Indefinite, contingent on appropriations.

CONTRACT FOR DREDGING CLEVELAND HARBOR.

Name of contractor: Great Lakes Dredge and Dock Company, Chicago, Ill.
Date of contract: July 12, 1909.
Date of approval: August 20, 1909.
Date of commencement: August 27, 1909.
Date of completion: November 30, 1909.

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[a] House Document No. 421, Fifty-seventh Congress, second session, page 304.

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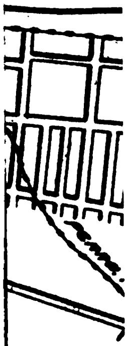

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COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Cleveland, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	6,768,424	Coal:	
Iron manufactures	9,701	Cargo	3,776,829
Coal, hard	25	Bunker	273,775
Coal, soft	7,600	Iron manufactures	207,339
Lumber	207,321	Cement	89,787
Salt	549	Packet freight	63,596
Copper	1,134	Miscellaneous	192,456
Flour	8,394		
Corn	8,314		
Wheat	20,242		
Oats	7,213		
Barley	2,880		
Hay	7,213		
Flax	29,930		
Sand and gravel	50,792		
Cement	8,189		
Stone flux	215,230		
Trap rock	7,420		
Building stone	333,638		
Fish	3,941		
Miscellaneous	90,493		
Total	7,788,643	Total	4,603,782

Total freight tonnage:	
1909	12,392,425
1908	10,159,170
Increase	2,233,255
Estimated value of freight for 1909	$86,427,520

Vessels.	Number.	Tonnage.
Entering	3,596	5,738,222
Departing	3,504	5,694,155
Built	3	3,568

Total registered tonnage—vessels entering and departing:	
1909	11,432,377
1908	11,806,498
Decrease	374,121

No new vessel lines established during the year.

O O 8.

IMPROVEMENT OF FAIRPORT HARBOR, OHIO.

For a description of the location, projects of improvement, and the general conditions at this harbor, see pages 2676 and 2677, Report of the Chief of Engineers for 1898.

The reasons for extending the west breakwater to the shore are discussed in the Annual Report of the Chief of Engineers for 1903, pages 2084 to 2087, inclusive, and the form of breakwater as adopted described in the report for 1905, page 2349.

The west breakwater is being extended seaward under contract with the Sea Coast Construction Company, of New York, N. Y., dated September 20, 1907, by their successors, The Breakwater Company. This contract contemplates construction of stone-filled timber-crib pierhead, 50 feet square, with a concrete superstructure to be built on the west side of the harbor entrance and the construction of so much of rubble mound breakwater required for connecting this pierhead with the existing timber-crib breakwater as the funds available will permit.

During the past year the concrete superstructure has been placed on the pierhead crib. The substructure of the breakwater, 1,000 feet in length, has been completed and work on the superstructure is well advanced.

Work on this contract is about 95 per cent completed.

A detailed statement showing the amount and price of materials placed in the work during the present fiscal year and the totals to date under this contract is shown in the following table:

	Contract price.	Fiscal year 1910.		Total to date.	
		Quantity.	Cost.	Quantity.	Cost.
Pierhead:					
Hemlock timber........M feet..	$55.00			137,101.0	$7,540.56
White-oak timber........do....	70.00	918.0	$64.26	918.0	64.26
Hard-wood timber........do....	60.00			13.691.0	821.46
Screw bolts and washers........pounds..	.08			15.168.6	1,213.49
Lag screws and washers........do....	.10			6,924.9	692.49
Tie rods and washers........do....	.05			6,160.0	308.00
Sleeve bolts and washers........do....	.10	734.4	73.44	734.4	73.44
Drift bolts........do....	.06			9.288.0	557.28
Corner straps........do....	.05			1,254.0	62.70
Spikes........do....	.04			64.0	2.56
Concrete blocks........cubic yards..	14.00	197.63	2,766.82	197.63	2,766.82
Concrete in mass........do....	11.00	565.21	6,217.31	565.21	6,217.31
Quarry-run stone........tons..	1.50	1,635.3	2,452.95	6,073.6	9,110.40
4-inch wrought-iron pipe and malleable fittings........pounds..	.04	337.0	13.48	337.0	13.48
Total........			11,588.26		29,444.25
Rubble mound breakwater:					
Quarry-run stone........tons..	1.50	3,175.4	4,763.10	54.530.8	81,796.20
Large placed stone........do....	1.50	5,997.1	8,995.65	5,997.1	8,995.65
Total........			13,758.75		90.791.85
Grand total........			25,347.01		120,236.10

The cost of the work done under this contract during the year, including inspection and contingencies, was $33,452.28.

Dredging necessary to the maintenance of the channel was done by the U. S. dredge *Burton* May 9 to 16, and 10,823 cubic yards of material was so removed at a field cost of $883.41.

The old crib-work portion of the west outer breakwater has deteriorated to some extent, but its repair is not considered necessary at present. The available funds will probably be sufficient to make needed repairs after new work to complete the project is provided for.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $150,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

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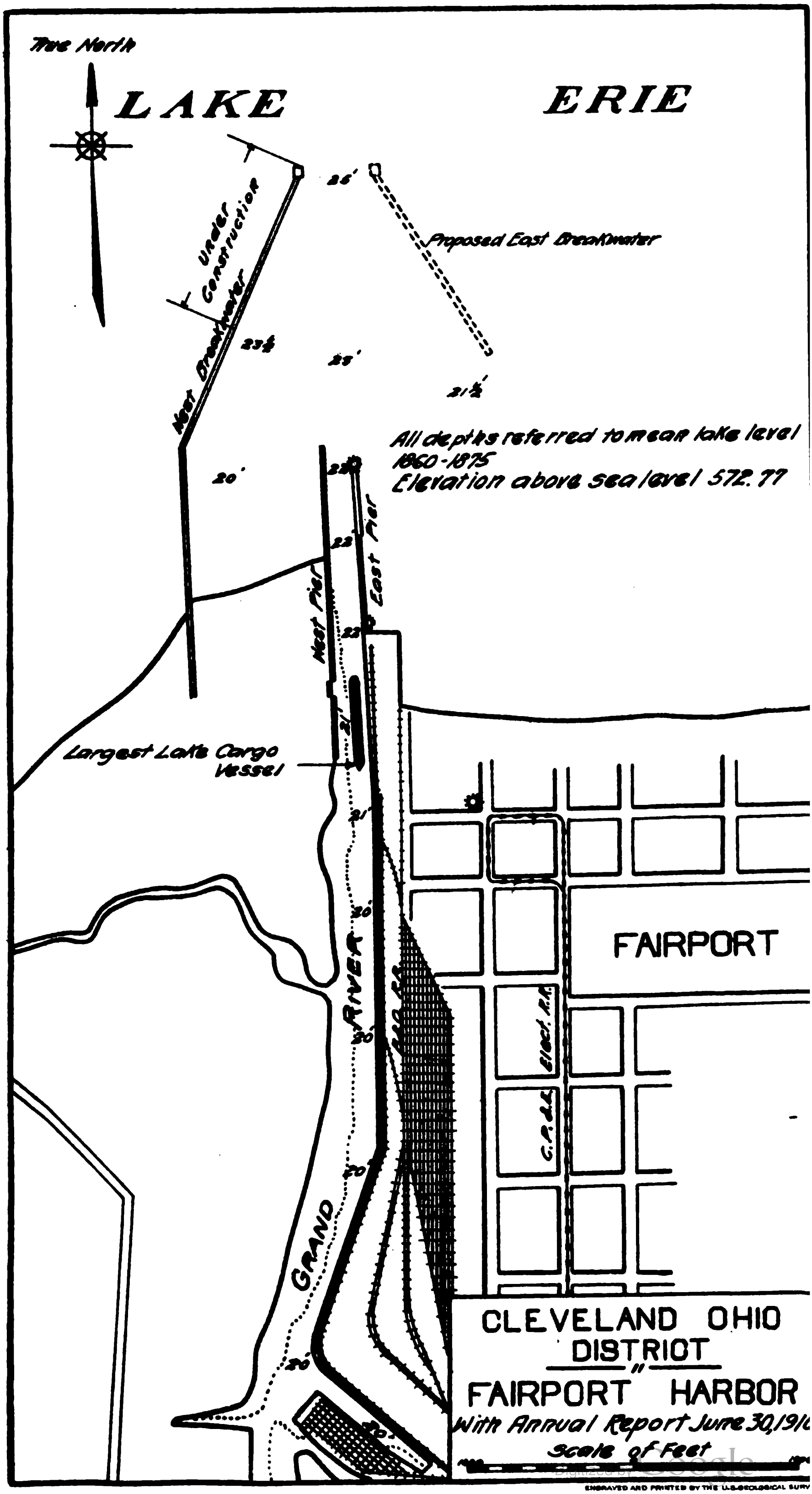
[a] Exclusive of the balance unexpended July 1, 1910.



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APPROPRIATIONS.

Prior to June 3, 1896[a]	$381,307.71
June 3, 1896	30,000.00
March 3, 1899	100,000.00
July 31, 1900 (allotment act June 6, 1900)	3,000.00
April 15, 1902 (allotment act June 6, 1900)	1,800.00
June 13, 1902	200,000.00
March 3, 1905	135,000.00
Received from other sources	208.44
March 2, 1907	100,000.00
March 20, 1909 (allotment act Mar. 3, 1909)	5,000.00
June 25, 1910	100,000.00
Total	1,056,316.15
Expended to June 30, 1910	908,341.66
Balance	147,974.49

CONTRACT IN FORCE.

CONTRACT FOR EXTENSION OF WEST BREAKWATER.

Name of contractor: Sea Coast Construction Company, New York.
Date of contract: September 20, 1907.
Date of approval: October 21, 1907.
Date of commencement: November 15, 1907.
Date of completion: June 30, 1909.
Extended: Time limit waived for a reasonable period.

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Fairport, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	1,942,390	Coal:	
Feed	1,018	Cargo	598,068
Flour	75,973	Bunker	58,166
Copper ore	501	Miscellaneous	420
Grain	6,559		
Miscellaneous	20,188		
Total	2,046,629	Total	656,654

Total freight tonnage:

1909	2,703,283
1908	2,302,275
Increase	401,008
Estimated value of freight for 1909	$15,359,009

Vessels.	Number.	Tonnage.
Entering	598	1,547,637
Departing	598	1,547,637

[a] House Document No. 421; Fifty-seventh Congress, second session, page 305.

Total registered tonnage—vessels entering and departing:	
1909	3,095,274
1908	2,403,188
Increase	692,086

No new vessel lines established during the year.

OO 9.

IMPROVEMENT OF ASHTABULA HARBOR, OHIO.

For a description of the localities, original conditions, and the various projects of improvement see page 2679 of the Report of the Chief of Engineers for 1898.

Under a contract with the Edward Gillen Dock, Dredge and Construction Company, dated July 10, 1909, the timber section of the west breakwater, 430 feet in length, was protected on the lake side with riprap stone, and the west breakwater was extended shoreward a distance of 280 feet. This extension was of rubble-mound construction. This contract involved the use of 38,740.3 tons of quarry-run stone, at $1.45 per ton, $56,173.43. The cost of the work under this contract during the year, including inspection and contingencies, was $59,825.85.

In accordance with the provisions of the river and harbor act of March 3, 1909, a survey of the harbor was made during the year, the report of which is contained in House Document No. 654, Sixty-first Congress, second session.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$376,430

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Prior to June 3, 1896	[b]$613,210.86
June 3, 1896	50,000.00
March 3, 1899	50,000.00
June 6, 1900	110,000.00
July 2, 1901 (allotment, act June 6, 1900)	3,000.00
March 1, 1901 (claim)	10,200.00
March 3, 1901	2,000.00
April 30, 1901 (allotment, act June 6, 1900)	2,858.45
June 13, 1902	200,000.00
June 28, 1902	200,000.00
March 3, 1903	$118,000.00
March 3, 1905	20,000.00
Received from other sources	3,557.05
March 2, 1907	20,000.00
June 25, 1910	115,000.00
Total	1,517,826.36
Expended to June 30, 1910	1,384,231.62
Balance	133,594.74

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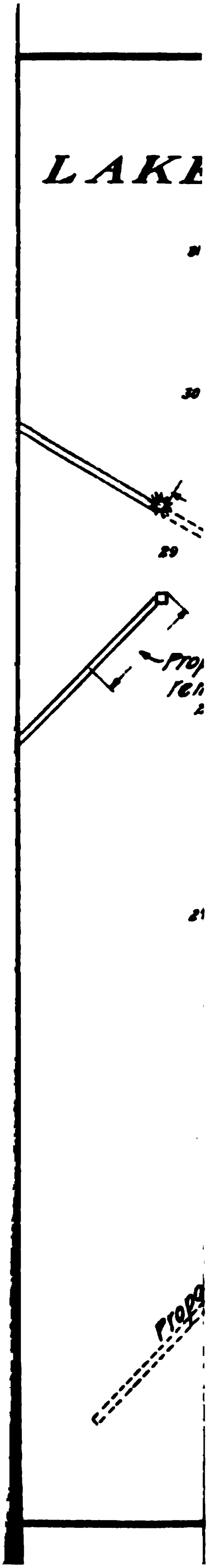
[a] Exclusive of the balance unexpended July 1, 1910.

[b] House Document No. 421, Fifty-seventh Congress, second session, page [illegible]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CONTRACT IN FORCE.

FOR EXTENDING AND REPAIRING WEST OUTER BREAKWATER.

Name of contractor: The Edward Gillen Dock, Dredge and Construction Company, Racine, Wis.
Date of contract: July 10, 1909.
Date of approval: August 11, 1909.
Date of commencement: August 5, 1909.
Date of completion: May 28, 1910.

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Ashtabula, Ohio, were compiled, under the direction of this office, from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	9,668,329	Coal:	
Lumber	1,219	Cargo	3,230,496
Fish	757	Bunker	238,111
Miscellaneous	1,053	Manufactured steel	9,036
		Miscellaneous	5,060
Total	9,671,358	Total	3,482,703

Total freight tonnage:

1909	13,154,061
1908	5,935,097
Increase	7,218,964
Estimated value of freight for 1909	$46,204,353

Vessels.	Number.	Tonnage.
Entering	1,877	5,794,812
Departing	1,877	5,801,376

Total registered tonnage—vessels entering and departing:

1909	11,596,188
1908	5,729,470
Increase	5,866,718

No new vessel lines established during the year.

O O 10.

IMPROVEMENT OF CONNEAUT HARBOR, OHIO.

The project for the improvement of this harbor was adopted in 1896, and is given in full on pages 2970 and 2971 of the Report of the Chief of Engineers for that year.

No contract work has been done during the year.

The entrance channel was maintained by the use of dredging plant belonging to the United States.

The dredge *Burton* worked at this harbor April 20 to May 8, and removed 18,698 cubic yards of material at a field cost of $1,709.80. The dredge *Maumee* worked at this harbor from October 6 to November 18, and removed 21,030 cubic yards of material at a field cost of $2,497.69.

In accordance with the provisions of the river and harbor act of March 3, 1909, a survey of the harbor was made during the year, the report of which is contained in House Document No. 653, Sixty-first Congress, second session.

The outer breakwaters have deteriorated to some extent. They are to be partly abandoned under present approved plans. The amount available is sufficient to maintain and repair them.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a] $160,000
Submitted in compliance with requirements of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Prior to June 30, 1896	[b] $192,629.39
June 3, 1896	40,000.00
March 3, 1899	100,000.00
July 2, 1900 (allotment, act June 6, 1900)	3,000.00
April 30, 1901 (allotment, act June 6, 1900)	2,068.20
June 13, 1902	200,000.00
March 3, 1903	10,000.00
April 28, 1904	240,000.00
March 3, 1905	60,000.00
Redeposited November 22, 1904	1,000.00
Received from other sources	$3,852.63
March 2, 1907	20,000.00
June 25, 1910	144,900.00
Total	1,017,450.22
Expended to June 30, 1910	[c] 846,893.90
Balance	170,556.32

COMMERCIAL STATISTICS.

The following statistics for the year 1909, relative to the commerce of the harbor of Conneaut, Ohio, were compiled under the direction of this office from various available sources:

Receipts.	Short tons.	Shipments.	Short tons.
Iron ore	8,409,400	Coal:	
Miscellaneous	2,975	Cargo	1,077,785
		Bunker	196,369
		Manufactured steel	54,093
		Miscellaneous	7,186
Total	8,412,375	Total	1,335,433

Total freight tonnage:	
1909	9,747,808
1908	6,467,334
Increase	3,280,474
Estimated value of freight for 1909	$37,686,054

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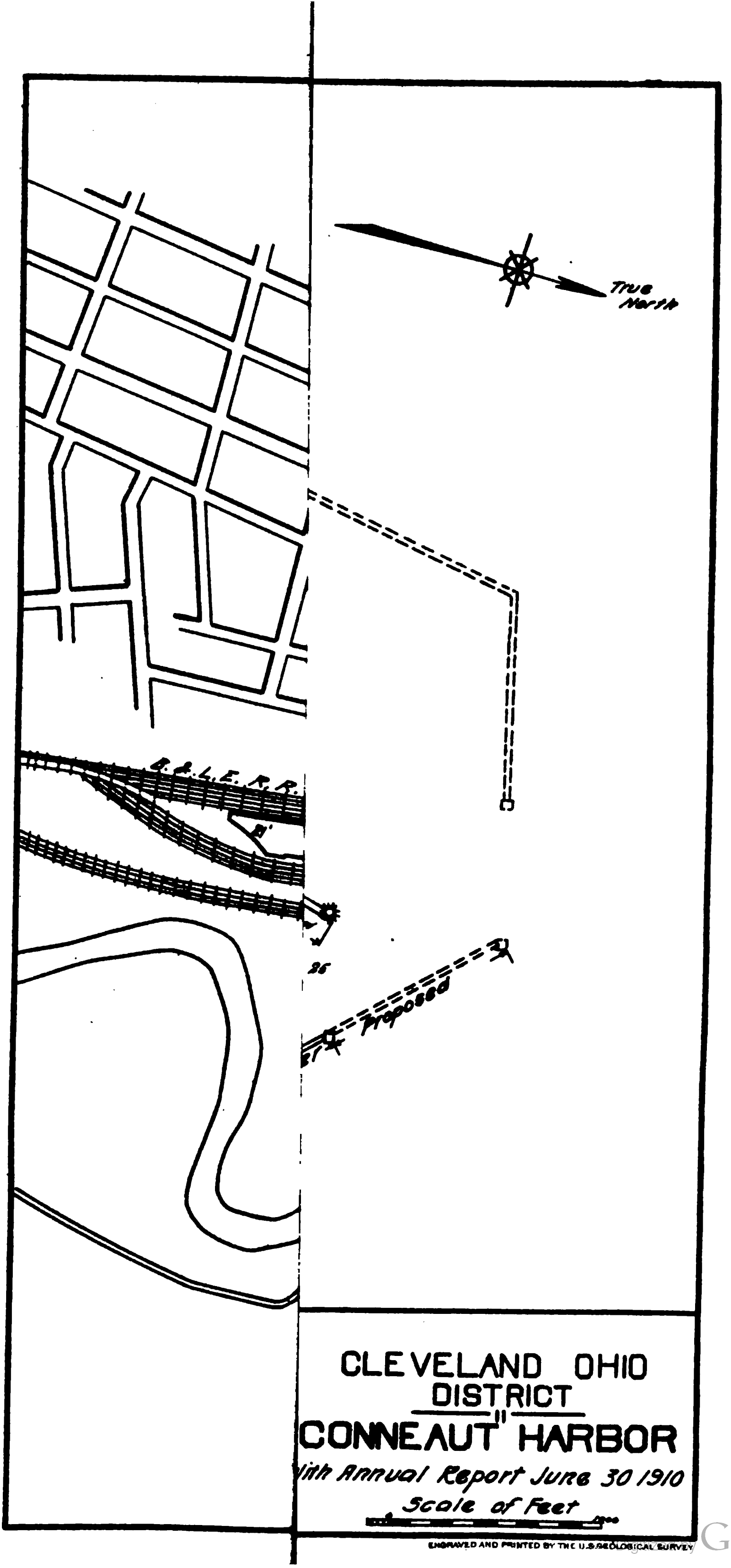
[a] Exclusive of the balance unexpended July 1, 1910.
[b] House Document No. 421, Fifty-seventh Congress, second session, page 304.
[c] Of this amount, $838.21 for Isthmian Canal Commission is to be refunded.



CLEVELAND OHIO
DISTRICT

CONNEAUT" HARBOR

ith Annual Report June 30 1910

Scale of Feet

ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

Vessels.	Number.	Tonnage.
Entering	1,552	5,383,804
Departing	1,548	4,626,850

Total registered tonnage—vessels entering and departing:

1909	10,010,654
1908	6,687,470
Increase	3,323,184

No new vessel lines established during the year.

O O II.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

During the year the wreck, schooner *Spademan*, was removed from South Passage, near South Bass Island, west end of Lake Erie, and wreck of tug *Osceola* was removed from entrance to the Wheeling and Lake Erie Railway Company's slip, Huron River, Huron Harbor, Ohio.

APPENDIX P P.

IMPROVEMENT OF RIVERS AND HARBORS IN THE BUFFALO, NEW YORK, DISTRICT.

REPORT OF COL. W. L. FISK, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Erie Harbor, Pennsylvania.
2. Dunkirk Harbor, New York.
3. Buffalo Harbor, New York.
4. Lake Erie entrance to Black Rock Harbor and Erie Basin, New York.
5. Black Rock Harbor and channel, New York.
6. Tonawanda Harbor and Niagara River, New York.
7. Niagara River, New York.

United States Engineer Office,
Buffalo, N. Y., July 14, 1910.

Sir: I have the honor to forward herewith reports of operations * * * on river and harbor works in this district during the fiscal year ending June 30, 1910.

Very respectfully, your obedient servant,

W. L. Fisk,
Colonel, Corps of Engineers.

The Chief of Engineers, U. S. Army.

P P 1.

IMPROVEMENT OF ERIE HARBOR, PENNSYLVANIA.

REPORT OF OPERATIONS.

At the beginning of the fiscal year there was no work in progress. Proposals for dredging 50,000 cubic yards, scow measure, to restore project depths in the entrance channels and harbor basin were opened July 15, 1909, and contract entered into with the lowest bidder, the Buffalo Dredging Company, Buffalo, N. Y.; contract approved August 25, 1909.

Dredging was begun October 9 and completed November 16, 1909. Total quantity dredged, 51,926 cubic yards, scow measure, sand, etc.; cost, $10,802.04, including engineering and contingencies. The outer and inner channels were restored to full depth of 20 feet at mean lake level for their project width of 300 feet and all shoal spots removed to the same depth in the harbor basin from the east line of the elevator slip to the east line of the project basin area.

To complete the dredging of the harbor basin as provided by project, a contract was entered into in the usual manner with the Central Dredging Company, Cleveland, Ohio, the lowest bidder, which was approved October 9, 1909, for dredging 150,000 cubic yards, scow measure, sand, etc. Dredging was begun with one dredge October 25, and up to November 8, 1909, when dredge was laid up, 7,111 cubic yards of material had been removed, and a channel 80 feet wide, 20 feet deep at mean lake level, had been completed from deep water to the west side of the State street extension of the Public dock.

The contractor having failed to fit out his dredge and resume operations in the spring of 1910, he was notified by letter, April 27, to state definitely what he proposed to do, which resulted in his making arrangements to resume dredging with plant of the Buffalo Dredging Company. At the close of the fiscal year dredging had not been resumed, but was expected to be resumed early in July, 1910, and completed by December 31, 1910, the time limit of the contract.

The surveillance of Presque Isle Peninsula was continued throughout the fiscal year, a watchman being on duty to see that no depredations were committed, to put out fires which occasionally occur, and to prevent squatters from settling along the harbor shore by hauling house boats thereon and thus establishing a residence.

CONDITION OF THE WORKS.

The south pier and south breakwater are in good condition. The north pier is in good condition except 755 feet with timber superstructure, which should soon be replaced with concrete.

The entrance channel and harbor basin are in fair condition, but some dredging will be required in the channel from time to time.

The preservation of the peninsula is of vital importance to Erie Harbor, and it is for the purpose of preserving the harbor that the protection of the weak parts of the peninsula has been deemed necessary. The weakest portion is the long, narrow neck at the western end, and works of protection have been constructed to prevent a breach through this narrow neck. The danger exists during severe storms from the westward.

The protection works for the neck consist of the remains of a shore protection constructed in 1889, which affords little or no protection, and the tree growth propagated and maintained on the neck. During 1896–1898 about 6,600 young locust and willow trees were planted on the neck of the peninsula. Most of these have grown finely, but some of the outer ones have been washed out by heavy seas.

The beach erosion along the body of the peninsula has not been materially corrected by jetties built out from the shore. At the present time there is one dilapidated jetty at the easterly end, no longer of service, and three jetties about the middle of the peninsula shore, one of which belongs to the Light-House Establishment, in fair condition.

Severe storms make some changes in the shore lines of the peninsula, but no serious damage is done.

PROPOSED OPERATIONS AND REMARKS.

Funds on hand and appropriated by the river and harbor act of June 25, 1910, will complete the project for improvement, except—

(*a*) Extension of the north pier as required from time to time to cover the advance lakeward of the 16-foot contour of depth.

(*b*) The conditional provision for two spurs on the outer shore of Presque Isle.

(*c*) Maintenance, which will be required indefinitely.

Pier extension is not now required and the construction of the spurs is not considered advisable. A reserve of $20,000 for the protection of Presque Isle Peninsula is on hand, as required by project. No funds for continuing improvement are, therefore, required for the fiscal year ending June 30, 1912.

Under maintenance, the replacement of 375 linear feet of old decayed timber superstructure on the north pier with concrete, at an estimated cost of $20,000, is advisable, and minor repairs on the piers and dredging in the entrance channels and harbor basin to maintain project depth, at an estimated cost of $10,000, will be necessary; total, $30,000.

Work in progress and to be done during the fiscal year 1911 will, it is expected, leave no unexpended balance June 30, 1911.

It is therefore recommended that this amount of $30,000 be appropriated for the fiscal year ending June 30, 1912.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS AND ALLOTMENTS.

For previous projects (as list in H. Doc. 421, 57th Cong., 2d sess.)	$841,867.23
September 19, 1890	40,000.00
July 13, 1892	40,000.00
August 18, 1894	10,000.00
May 11, 1896	1,289.33
March 3, 1899	125,000.00
June 13, 1902	$125,000.00
March 3, 1905	125,000.00
March 2, 1907	120,000.00
June 25, 1910	70,000.00
Received from sales	4,725.72
Total	[b]1,502,882.28

CONTRACTS IN FORCE.

FOR DREDGING IN HARBOR BASIN, ERIE, PA., DATED SEPTEMBER 30, 1909.

Name of contractor: The Central Dredging Company, Cleveland, Ohio.
Rates: Dredging, per cubic yard, scow measure, 18 cents.
Date of approval: October 9, 1909.
Date of commencement: October 25, 1909.
Date of completion: December 31, 1910.
Total amount of contract: $27,000.

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] In addition to this amount there was allotted, January 11, 1871, from the appropriation made by the act of July 11, 1870, for examinations and surveys for improvements, etc., and for contingencies of rivers and harbors, the sum of $10,000, to be applied to works for the protection of the peninsula at Erie Harbor. The early office records having been destroyed by fire in 1887, it is impracticable to state at this time how much of this allotment was actually expended for the purpose for which it was made.

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the year ending December 31, 1909.

Vessels.	Arrivals from—				Departures to—			
	Home ports.		Foreign ports.		Home ports.		Foreign ports.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
Steam	907	1,724,046	187	116,161	923	1,740,288	189	118,103
Sail and barges	57	88,594	68	26,761	72	129,205	70	26,193
Total	964	1,812,640	255	142,922	995	1,869,493	259	144,296

Total arrivals and departures:	
Number	2,473
Tonnage	3,969,351
Increase of tonnage, 1909 over 1908	278,773
Amount of revenue collected, year 1909:	
Lake commerce	$2,424.00
Rail commerce	$29,949.00
Value of imports:	
Lake	$249,134.00
Rail	$79,538.00
Value of exports, lake	$449,970.00
Enrolled tonnage, port of Erie, Pa......gross tons	79,408
Greatest draft of vessels......feet	20½

New lines of transportation established: Cleveland and Buffalo Transit Company.

Receipts and shipments by lake.

RECEIPTS.

[Tons of 2,000 pounds.]

	1905.	1906.	1907.	1908.	1909.
Merchandise	148,091	145,125	165,772	146,373	129,332
Barley	1,408	282	....	490	6,127
Corn	19,535	41,225	25,982	1,448	1,400
Wheat	41,515	113,734	138,107	58,850	14,069
Flaxseed	6,943	3,056	3,079	....	2,396
Flour	148,091	164,363	155,615	173,886	140,083
Lumber	16,431	19,182	17,049	6,812	16,186
Lath	....	240	80	500	25
Poles and stave bolts	....	....	8	....	26
Iron ore	2,377,213	2,486,518	2,657,410	928,012	1,383,264
Copper	4,489	8,290	7,656	10,753	10,294
Lead	8,411	272	45	3,955	364
Stone	7,750	3,610	9,000	49,782	230
Fish	4,469	2,100	5,189	3,979	5,330
Pulp wood	29,766	28,396	39,536	36,480	77,456
Ice	....	....	....	....	480
Total	2,814,112	3,016,393	3,224,528	1,421,310	1,787,361

SHIPMENTS.

Anthracite coal	291,900	295,000	423,985	416,853	301,115
Bituminous coal	521,866	833,591	1,082,569	760,335	868,520
Merchandise	132,350	142,246	423,985	126,590	187,900
Total	946,116	1,270,837	1,930,539	1,303,778	1,357,535

P P 2.

IMPROVEMENT OF DUNKIRK HARBOR, NEW YORK.

REPORT OF OPERATIONS.

At the beginning of the fiscal year no work was in progress.

Repairs urgently necessary on the west pier consisted of replacing 30 linear feet of wrecked timber crib substructure and 50 linear feet of decayed and wrecked timber superstructure at the outer end of the pier, adjoining the pierhead light.

Proposals for these repairs were opened June 29, 1909, and an emergency contract entered into with the Great Lakes Construction Company, Buffalo, N. Y., the lowest bidder, July 2, 1909. The construction of a new crib to replace the 30 feet of wrecked substructure was begun at the contractor's yard at Tonawanda, N. Y., on September 24, and completed October 9, 1909. The contractor having made written request to postpone further work, owing to bad weather, until the opening of the season of 1910, the contract time limit, October 31, 1909, was waived, as authorized October 25, 1909. The crib and contractor's plant were towed to Dunkirk, June 17, 1910, and at the close of the fiscal year the removal of the wrecked crib work had been completed and the foundation was nearly ready for sinking the new crib in place.

CONDITION OF THE WORKS.

The timber sections of the west pier, one 110 and one 216 feet long, and the old timber part, 1,341 feet long, of the breakwater, are in poor condition, and need repairs annually, owing to damage by severe storms.

Examination made June 21–25, 1910, showed:

Outer entrance channel, from deep water in the lake to the elbow in the breakwater, not less than the required depth of 19 feet at mean lake level, for full width, except over a shoal area about 400 feet long on the west-channel line, lakeward from Dunkirk Pierhead Light, and extending into the channel from that line about 150 feet. The least depth on the shoal is 15½ feet, and the remainder of the channel along the easterly side of the shoal, 100 feet wide, is 19 feet deep at mean lake level.

Inner entrance channel, from the breakwater elbow to the harbor basin, not less than the required depth of 18 feet at mean lake level.

Harbor basin, required depth 18 feet at mean lake level, has shoaled so that the general depth is now 17½ feet in the north half of the basin and 16 feet in the south half.

PROPOSED OPERATIONS AND REMARKS.

The project for improvement, except the additional channel excavation provided for by the special appropriation in the river and harbor act of 1910, has been completed except maintenance, which will be required indefinitely.

The additional channel excavation will be done with the funds specially appropriated therefor, and repairs to place the pier and breakwater in as good condition as practicable will be completed in

1910 with funds on hand, including an allotment of $5,000 from the river and harbor appropriation of March 3, 1909.

No estimate of funds is therefore made for the fiscal year ending June 30, 1912.

APPROPRIATIONS AND ALLOTMENTS.

For previous projects (as listed in H. Doc. No. 421, 57th Cong., 2d sess.)	$551, 579. 38
June 3, 1896	10, 000. 00
June 4, 1897	398, 258. 00
June 13, 1902	25, 000. 00
Sales and repayment	380. 00
March 3, 1909 (allotment Apr. 5, 1909)	5, 000. 00
June 25, 1910	99, 275. 00
Total	1, 089, 492. 38

CONTRACTS IN FORCE.

EMERGENCY CONTRACT FOR TIMBER-CONCRETE PIER AT DUNKIRK HARBOR, N. Y., DATED JULY 2, 1909.

Name of contractor: Great Lakes Construction Company, Buffalo, N. Y.

Rates:

Removing old pier—lump sum		$1, 200. 00
Hemlock timber in place	per M feet b. m.	50. 00
Bolts and spikes in place	per pound	. 05¼
Concrete blocks in place	per cubic yard	14. 00
Concrete mass in place	do	10. 00

Date of commencement: August 2, 1909.
Date of completion: October 31, 1909.
Time limit waived.
Total amount of contract: $4,574.

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the year ending December 31, 1909.

Vessels.	Arrivals from home ports.		Departures to home ports.	
	Number.	Tons.	Number.	Tons.
Steam	35	600	37	595

Total arrivals and departures:		
Number		72
Tonnage		1, 195
Decrease in tonnage, 1909 under 1908	tons	2, 227
Amount of revenue collected for the year 1909, rail		$2, 238. 89
Value of imports, rail		$10, 861. 00
Receipts and shipments by lake		None.
Enrolled tonnage, port of Dunkirk, N. Y	gross tons	822
Greatest draft of vessels	feet	6
New line transportation established		None.

P P 3.

IMPROVEMENT OF BUFFALO HARBOR, NEW YORK.

REPORT OF OPERATIONS.

Extension of Stony Point section of breakwater.—This extension to have a length of 1,000 feet, running in a northwesterly direction from the north end of the present Stony Point section, at an angle of 150° from the axis of said section, and built of stone; it is called the "south entrance arm."

The foundation, to a height of 12 feet below mean lake level, was made by dumping stone excavated from Lake Erie entrance to Black Rock Harbor and Erie Basin. The construction of the stone breakwater upon this foundation was begun in 1906 under contract with the Canal Quarry Company to the extent permissible with $130,000, the amount available at the time of making the contract. Work under this contract, time limit waived, was continued during the fiscal year until April 15, 1910, when permissible work was completed. Under this contract 616 linear feet of stone structure was completed and 184 linear feet additional built to varying heights up to 12 feet above water level, at a cost of $130,775.60, including contingencies and engineering.

The river and harbor act of March 2, 1907, appropriated $52,336 for this work. Under contract in force with the Breakwater Company, Cleveland, Ohio, under which it is expected to complete the breakwater arm, operations were begun May 23, 1910, and placing of stone was in progress, no structure fully completed, at the close of the fiscal year.

Repairs to breakwater damaged by storm of January 20, 1907.—A severe windstorm on January 20, 1907, damaged the old section of the breakwater for a distance of 1,910 feet, the timber superstructure being practically destroyed. Damage was also done to the decks and walls on other portions of the timber breakwater.

An appropriation of $350,000 was made by the river and harbor act of March 2, 1907, to repair this damage, and a considerable part of it was repaired in 1907, as stated in the annual report for 1908. The repair of the 1,910 feet section of old breakwater, under a project submitted and approved for replacing the wrecked superstructure with a stone and concrete structure, was begun under contract with the Great Lakes Construction Company, Buffalo, in 1907.

Work under this contract was continued during the fiscal year, contract time limit waived, until the entire structure was completed, June 6, 1910, at a cost of $283,438.19, including contingencies and engineering.

Excavating shoals outside north entrance to harbor.—An appropriation of $56,100 was made by the river and harbor act of March 2, 1907, for excavating rock shoals at entrance of Buffalo Harbor to a depth of 23 feet at mean lake level.

A project for the work was forwarded and approved, and contract was made June 14, 1907, with the Lake Erie Dredging Company, the lowest bidder.

Work was begun in June, 1907, and was continued through the fiscal years 1908, 1909, and 1910; time limit waived. Slow progress has been made, largely on account of unfavorable weather and sea.

Dredging was in progress at the beginning of the fiscal year and was continued with one large dredge to July 19, 1909, when all blasted rock, 6,137 cubic yards, scow measure, had been removed. An examination made at the close of the dredging showed that an area 600 feet long and 300 feet wide on the crest of the south rock shoal had been excavated to the required depth of 23 feet at mean lake level, except spots on which the depth was 21 to 23 feet. Drilling and blasting rock on these high spots was begun with one drill boat August 6 and continued as weather permitted during September and October; worked 7 days in August; 6 days in September, and 6 days in October, and drilled and blasted rock over an area of about 6,000 square feet. Owing to continued unfavorable weather and sea the drill boat was withdrawn from the work November 1.

Dredging was resumed May 13, 1910, with one dredge and continued as sea permitted to the close of the fiscal year; worked 10 days in May and 16 days in June; removed 390 cubic yards sand and 5,613 cubic yards, scow measure, of blasted rock.

At the close of the fiscal year the removal of the shoals to the extent provided for by the appropriation of March 2, 1907, and the contract in force, was 95 per cent completed.

Detailed examinations of the shoals outside of the north entrance showed the existence of a shoal area north of the main shoal, now removed, on which the depth of water is 20.7 to 23 feet at mean lake level. The removal of this shoal to 23 feet depth at mean lake level, necessary to provide a safe channelway for large vessels making the turn at this entrance, and estimated at $37,400, is authorized and the funds provided by the special appropriation in the river and harbor act of June 25, 1910. Specifications for this work were prepared, forwarded to the department, and received back approved June 29.

Miscellaneous.—The inspection steamer *Thomas Lincoln Casey* was on duty throughout the year on the inspection of operations on harbor works, on the care of floating plant, and on the enforcement of laws for the protection of navigation, notably the dumping of dredgings.

A watchman was on duty throughout the year at the United States engineer storehouse on the south pier for the care of public property, and he also acted as ferryman for employees and supplies to and from the storehouse, and had charge of the automatic water gauge.

The north pier at the entrance to Buffalo River, occupied by the Delaware, Lackawanna and Western Railroad Company, is the only one of the government harbor works permanently occupied by corporations or private parties.

The occupancy was begun in 1878. A history of this occupancy and copies of official documents relating thereto are given in the Annual Report of the Chief of Engineers for 1889, pages 2373–2383; for 1898, page 2775 et seq.; and for 1904, pages 3258 and 3259.

CONDITION OF THE WORKS.

At the close of the fiscal year the condition of the works was as follows:

Entrance piers and channel.—These works, forming the entrance to the inner harbor, which comprises Buffalo Creek and city ship canal, were in fair condition.

The north pier, still in the possession of the Delaware, Lackawanna and Western Railroad Company, is a timber crib structure and is kept in repair by the railroad.

Repairs consisting of tearing out the channel face wall of the second 100 linear feet from the outer end of the pier and rebuilding with new tie heads and face timbers and replacing stone filling and placing new deck were made by the company March 18–April 20, 1910.

The south pier has a concrete superstructure for its full length and is in good condition.

The entrance channel is dredged 23 feet deep at mean lake level for a width of 200 to 300 feet for 2,200 feet outward from the outer end of the north pier, and is not less than 22 feet deep thence lakeward; between the piers the depth is from 23 to 25 feet for width of 150 feet, except at the inner end (junction of Buffalo River and the city ship canal), where the depth is 21½ to 23 feet over bed rock.

Breakwater system.—This system comprises four sections of breakwater separated by three entrance channels.

The north breakwater, 2,203 feet long, is a permanent concrete structure and is in good condition.

The old breakwater is 7,608 feet long, of which 4,894 feet is in permanent concrete form, 1,910 feet in stone-concrete form, and 804 feet in timber cribwork. This section needs heavy riprap along the lake face.

The south harbor breakwater is 9,989 feet long. The northerly 7,250 feet is of rubblestone type, a permanent form. The next 360 feet is of timber crib with stone sea slope, and the adjoining 363 feet of timber crib with stone superstructure and sea slope. Following is 1,800 feet of timber crib with concrete superstructure, and the southerly 216 feet is timber crib with timber superstructure. All in good condition, but needs heavy riprap along the lake face of the timber-concrete portion.

The Stony Point breakwater is 2,803 feet long, connecting with the shore, and is of timber-crib type. This section is in fair condition, but needs heavy riprap along the lake face.

PROPOSED OPERATIONS AND REMARKS.

It is proposed during the next fiscal year, with funds now on hand, to continue the extension of the Stony Point section of breakwater; to make minor repairs and place riprap along the Old, South Harbor, and Stony Point sections of the breakwater; also to widen the Buffalo River entrance channel outside the piers to 400 feet, with a depth of 23 feet at mean lake level, and remove a rock area at its inner end to same depth.

With funds provided by the river and harbor act of June 25, 1910, contracts will be entered into as soon as practicable for the work authorized in that act, viz, the removal of the Watson Elevator site and additional excavation of rock shoals outside of the north entrance.

Funds on hand and appropriated by the river and harbor act of June 25, 1910, will complete the project of improvement, except maintenance, which will be required indefinitely.

For maintenance, funds on hand for "repairing and rebuilding breakwaters," and "outer harbor and maintenance of structures and channels" are considered sufficient, and no estimate is therefore made for the fiscal year ending June 30, 1912.

ALLOTMENT AND APPROPRIATIONS.

For previous projects (as listed in H. Doc. 421, 57th Cong., 2d sess.)	$2,837,995.37
June 4, 1897	481,250.00
July 1, 1898	489,746.00
March 3, 1899	485,498.00
March 3, 1899	75,000.00
March 3, 1901	400,000.00
June 13, 1902	30,000.00
June 28, 1902	$200,000.00
March 3, 1905	150,000.00
March 3, 1905	143,506.00
March 2, 1907	533,436.00
March 3, 1909	3,264.44
June 25, 1910	99,605.00
Received from other sources	1,395.15
Total	5,930,695.96

CONTRACTS IN FORCE.

FOR REMOVING SHOALS OUTSIDE NORTH ENTRANCE TO BUFFALO HARBOR, DATED JUNE 14, 1907.

Name of contractor: Lake Erie Dredging Company, Buffalo, N. Y.
Rate: Excavation, per cubic yard, scow measure, $1.74.
Date of approval: June 28, 1907.
Date of commencement: June 17, 1907.
Date of completion: December 31, 1907.
Total amount of contract: $55,000.
Time limit waived.

FOR COMPLETING CONSTRUCTION OF STONE BREAKWATER, SOUTH CHANNEL ARM, DATED APRIL 30, 1909.

Name of contractor: The Breakwater Company, Cleveland, Ohio.
Rates:

Rubblestone in place	per ton	$1.30
Capping stone in place	do	2.45

Date of approval: May 28, 1909.
Date of commencement: September 3, 1909.
Supplemental contract dated August 17, 1909, postpones date of commencement to June 1, 1910.
Date of completion: June 30, 1911.
Total amount of contract: $51,298.75.

COMMERCIAL STATISTICS.

[Compiled from records by collector of customs and from annual report of the Chamber of Commerce of Buffalo, N. Y.]

Arrivals and departures of vessels for the year ending December 31, 1909.

Vessels.	Arrivals from—				Departures to—			
	Home ports.		Foreign ports.		Home ports.		Foreign ports.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
Steam	2,634	6,046,947	266	389,079	2,691	6,273,489	214	341,579
Sail and barges	101	438,216	326	114,473	114	461,302	313	106,302
Total	2,735	6,485,163	592	503,552	2,805	6,734,791	527	447,881

Total arrivals and departures:	
Number	6, 659
Tonnage	14, 171, 387
Increase in tonnage, 1909 over 1908	2, 167, 419
Amount of revenue collected, year 1909:	
Lake commerce	$406, 237. 66
Rail commerce	769, 160. 99
Total	1, 175, 398. 65
Value of imports:	
By lake	2, 071, 987. 00
By rail	7, 383, 841. 00
Total	9, 455, 828. 00
Value of exports:	
By lake	1, 333, 766. 00
By rail	27, 922, 493. 00
Total	29, 256, 259. 00
Enrolled tonnage, port of Buffalo gross tons	258, 934
Greatest draft of vessels feet	20

New line of transportation: Douglass Steamship Company.

Receipts by lake for the year 1909.

[Tons of 2,000 pounds.]

Articles.	Quantity.	Articles.	Quantity.
Barley	305,405	Oats	203,387
Broom corn	555	Oatmeal	15
Canned goods	295	Oil cake	932
Corn	430,201	Peas	3,417
Corn meal	22	Pelts	660
Copper	87,553	Rags	6,043
Feed	168,191	Rye	16,089
Fish	383	Seeds	4,766
Flaxseed	274,422	Shingles	109,875
Flour	766,985	Soap	9
Glucose	20,143	Spelter	1,222
Iron ore	5,188,944	Starch	5,118
Iron, pig	52,718	Tallow	598
Hair	320	Ties	709
Lath	901	Wheat	1,858,658
Lead, pig	66	Wool	20,160
Lumber	187,898		
Malt	150	Total	9,923,176
Merchandise	206,368		

Shipments by lake for the year 1909.

[Tons of 2,000 pounds.]

Coal	3, 052, 706
Cement	185, 332
Railroad iron	82, 374
Salt	53, 892
Sugar	195, 738
Unclassed freight [a]	651, 795
Total	4, 221, 837

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[a] From Monthly Summary of Commerce and Finance, 1909, Bureau of Statistics, Department of Commerce and Labor.

The following statistics of the canal commerce of Buffalo for the year 1909 are furnished by the state superintendent of public works:

Canal clearances	2,115
Freight received, Buffalo tons	694,819
Freight shipped, Buffalo do	873,796
Steamers and canal boats navigating from Buffalo on canal, about	500
Average freight rate, Buffalo to New York, for wheat, per bushel	$0.039

Assuming that the number of arrivals of canal boats equaled the number of clearances, the grand total of the commerce of Buffalo by lake and canal for the calendar year 1909 is as follows:

	Arrivals and departures.	Receipts of freight.	Shipments of freight.
	Vessels.	*Tons.*	*Tons.*
Lake	6,659	9,923.176	4.221,837
Canal	4,230	694,819	873,796
Total	10,889	10,617,995	5,095,633

Total receipts and shipments, 15,713,628 tons.

P P 4.

IMPROVEMENT OF LAKE ERIE ENTRANCE TO BLACK ROCK HARBOR AND ERIE BASIN, NEW YORK.

REPORT OF OPERATIONS.

No operations during the fiscal year.

The excavation of the channel and basin, which is the whole project, was completed December 29, 1908, as reported in the Annual Report for 1909.

PROPOSED OPERATIONS AND REMARKS.

All of the funds authorized for this improvement have been appropriated and expended, the project has been completed, and no further estimate is made.

APPROPRIATIONS.

June 13, 1902	$200,000
March 3, 1903	200,000
April 28, 1904	125,000
March 3, 1905	52,000
June 30, 1906	237,643
Total	814,643

COMMERCIAL STATISTICS.

For the commercial statistics relating to this work reference is made to the statistics of Buffalo Harbor. There are no means of separating the statistics relating to the portion of the harbor covered by this improvement from the general statistics of the harbor.

P P 5.

IMPROVEMENT OF BLACK ROCK HARBOR AND CHANNEL, NEW YORK.

REPORT OF OPERATIONS.

Work was continued during the fiscal year under contracts in force as follows:

Empire Engineering Corporation.—Excavation of 6,300 linear feet, more or less, of the channel, beginning at the south end, station 0 to station 63. Estimated amount of contract, $664,000.

Excavation was continued from July, 1909, to January, 1910, with two dredges, two Lobnitz rock breakers, and two drill boats; plant laid up for winter to April, 1910, when work was resumed and continued to close of the fiscal year.

The contractor having represented that this plant would maintain a rate of rock excavation of 140,000 cubic yards per season and the actual rate for the season of 1909 being only slightly over 90,000 cubic yards additional plant was called for, and resulted in a third drill boat being added to the working plant May 23, 1910.

This increase was required owing to the inability of the Lobnitz rock breakers to break rock fast enough to enable the two dredges to excavate at a fair rate in the rock as broken up by these machines.

During the fiscal year 18,422 cubic yards of material overlying bed rock and 96,265 cubic yards of bed rock, place measure, were excavated, and at its close the channel had been excavated for full width, except cleaning up, from stations 0 to 2, 10 to 20, and 21+50 to 23+50, total 1,400 linear feet, and partly excavated for the remaining 4,900 linear feet. The canal wall had been removed for the length of 1,145 feet out of a total of about 1,150 linear feet required. The work was about 61 per cent completed.

A survey of the excavation completed in 1909 was made February–March, 1910, and showed an excavation more than that previously estimated for in monthly payments, amounting to $18,968.05. This amount was paid to the contractors under paragraph 71 of the specifications.

The contractors should have completed the work December 31, 1908, and earned approximately $664,000. The actual earnings to the close of the fiscal year were $404, 923.31.

Buffalo Dredging Company.—Excavation of 3,400 linear feet, more or less, of the channel, stations 63 to 97+. Estimated amount of contract, $675,000.

Excavation was in progress with two dredges and three drill boats at the beginning of the fiscal year, and was continued with a gradual reduction of plant as conditions required until the end of October, 1909, when operations were suspended, the channel having been completed except the trunk sewer section, 200 linear feet, which can not be excavated until the sewer obstructing the channel is removed by the city of Buffalo, as required by order of the Secretary of War, dated August 3, 1909.

During the fiscal year 8,978 cubic yards of material overlying bed rock and 66,319 cubic yards of bed rock, place measure, were excavated.

The canal wall had all been removed, viz, 3,500 linear feet.

The work was about 95 per cent completed.

A survey of the excavation completed in 1909 showed an excavation more than that previously estimated for in monthly payments amounting to $21,783.74. This amount was paid to the contractors under paragraph 64 of the specifications.

In conformity with contract specifications relating to the removal of the sewer, and on due authority a supplemental contract was entered into with the contractor, under which he was paid $25,000 of the $30,000 retained percentage on contract payments, the remaining $5,000 being considered ample guaranty for the completion of the small part of the channel excavation remaining to be done. Under the supplemental contract the channel is to be completed within six months after date of the written permission of the engineer, prescribed in paragraph 39 of the specifications.

The removal of the sewer and constructing a new sewer below the grade of the new channel was begun by the Buffalo Dredging Company November 27, 1909, under a contract with, and at the expense of, the city of Buffalo, and at the close of the fiscal year was about 40 per cent completed.

MacArthur Brothers' Company.—Construction of concrete walls for ship lock. Total amount $823,304.45.

At the beginning of the fiscal year the cofferdam inclosure was unwatered to the depth of the uncompleted excavation for lock walls, viz, 37½ to 38½ feet below mean river level, and this condition was being maintained against leaks through bed rock by practically continuous operation of one 15-inch and one 12-inch centrifugal pump and intermittent operation of another 12-inch and one 10-inch pump.

In this unwatered condition the cofferdam itself proved to be of ample strength and efficiency for the existing outside pressure of 40 to 45 feet of river silt and sand completely saturated with water, and to be water-tight. Excavation to depths of 40 to 45 feet to clean rock surface for lock wall foundations, carried on throughout the fiscal year, caused no change of any kind in the efficiency or water-tightness of the cofferdam.

The bed rock on which the concrete lock walls and sills are to be founded was found to be the stratified limestone of the locality with seams and cracks through which water flowed with varying force and in volume varying from minute "trickles" to boils 2 feet in diameter and height.

The stoppage of large leaks or boils at station 6+50 and 6+90 west side and 7+25 east side, on plans agreed upon as provided by paragraph 52 of contract specifications, was undertaken in July, 1909, and these leaks brought under control by placing around them blocks of concrete founded on bed rock, with relief pipes to relieve pressure and direct flow. Similar work on two other large leaks could not be done in July, 1909, owing to too great depth of water as held by the contractor's pumps, which, as installed, could not maintain suction below 38½ feet.

Rock bottom at the north end of the lock site being unwatered under existing conditions, the contractor completed the excavation, by hand shoveling, to bed rock for lock walls and sill of the lower gate space, 122 linear feet, and began placing concrete July 15; continuing this work day and night, in connection with placing granite quoins, culvert pipes, pump well, and gate-operating installations, until the section No. 1 was completed August 30.

Unwatering to complete excavation to bed rock for the next section of lock walls, No. 2, not being practicable with the pumps as installed, the contractor purchased and installed a 20-inch turbine pump at station 4+70, west cofferdam wall, in August, the operation of which, in addition to the other pumps at south end, lowered the unwatered level to 41 feet.

Under these conditions work was done on leaks at station 6+50, 6+90, and 7+25, to confine them within concrete blocks, with pipes to divert flow.

The contractor completed excavation, by hand shoveling, to bed rock for the east and west lock walls, section 2, 163½ linear feet, and began placing concrete in these sections September 12; completed west wall September 30 and east wall October 9.

Under the same conditions of pumping to maintain unwatering of cofferdam inclosure and the same methods of excavation, the rock foundations were prepared for the middle gate-space walls and sill, section 3, 100 linear feet.

Placing concrete in section 3 was begun October 19; east wall completed November 21; west wall completed November 23.

Work was done on leaks at station 4+57 and 4+33 to confine them within concrete blocks, with pipes to divert flow, in November, and the rock foundations prepared, excavation by hand shoveling, for the east and west lock walls, section 4, 152 linear feet, and concrete bases placed for these sections.

This work was completed December 18, when the contractor's plant was laid up for the winter.

The contractor continued pumping against leaks through the bed rock to hold the water level below his pumps and concrete plant, viz, 27 to 29 feet below river level, during the months of January, February, March, and April, to the 11th; operating one 15-inch and one 12-inch centrifugal pump, electric motor driven; one pump running nearly continuously and the other intermittently.

The water level was then lowered with the same two pumps to 34 to 39 feet below river level to set forms for placing concrete in section 4 of lock walls, and while setting forms the 20-inch turbine pump and its electric motor were moved from the west wall to the intermediate lock-gate sill and installed there, with discharge pipe through the gate spar recess and thence over the west cofferdam.

From May 1 to the close of the fiscal year the cofferdam inclosure was maintained unwatered to bed rock and to the depth of uncompleted excavation, 37½ to 42 feet below mean river level, by practically continuous operation of the 15-inch pump and intermittent operation of the 12-inch and 20-inch pump. Earth dams were built to divert the flow from leaks north of the upper-gate space section, section 6, to the 20-inch pump, on the intermediate lock-gate sill, and the flow from two large leaks in section 6 was controlled by the 12-inch and 15-inch pumps.

Placing concrete in section 4, 152 linear feet on each lock wall, was begun May 2 and completed May 17. Placing concrete in section 5, 152½ linear feet on each lock wall, was begun May 20 and completed June 7.

The uncompleted excavation for section 6, the last to be built and comprising all of the upper-gate space, walls and sill, 127 linear feet, implied a large amount of removal of sand and clay overlying bed rock. This was begun in May, being done principally by hand shoveling and wheelbarrows, and had advanced so that the placing of concrete base for the upper sill was begun June 24. About one-half of the base was completed at the close of the fiscal year.

The following is a summary of materials placed and work done and accepted, with cost thereof, for Black Rock ship lock, to July 1, 1910:

COFFERDAM AND WALLS FOR SHIP LOCK.

Summary of materials placed and work done and accepted, with cost, exclusive of engineering and contingencies, to July 1, 1910.

Items.	Unit measure.	Quantities.	Contract price.	Total.
Cofferdam:				
Steel sheet piling	Tons	6,546.116	$53.00	$346,944.15
Steel waling and braces	Pounds	170,705.0	.05	8,535.25
Clay filling	Cubic yards	26,543.0	.45	11,944.35
Clay banking	do	None.	.35	
Pumping and maintenance [a]	Lump		8,000.00	
Dredging channel	Cubic yards	4,450.0	.16	712.00
Total				368,135.75
Stopping leaks, paragraph 52, contract specifications				5,763.24
Placing stone embankment inside cofferdam				6,445.00
Cutting off Amherst street dock				79.26
Total cofferdam				380,423.25
Lock walls:				
Excavation	Cubic yards	142,071.0	.19	26,993.49
Handling and placing by derrick	do	None.	.40	
Concrete	do	55,945.4	4.37	244,481.39
Granite quoins	do	198.7	60.00	11,922.00
Steel culverts:				
72-inch	Linear feet	1,293.1	15.65	20,237.03
Inlets, 30-inch	do	None.	8.65	
Branches, 18-inch	do	209.0	6.65	1,389.85
Pump well pipe, 30-inch	do	101.59	8.65	878.75
Steel drain pipes, 18-inch	do	55.5	6.65	369.08
Steel I-beams and channels	Pounds	13,816.0	.05	690.80
Cable pipe, lap-welded	do	7,195.0	.10	719.50
Cast-steel pivot bases	Number	6.0	100.00	600.00
Steel eyebars	do	24.0	65.70	1,576.80
Anchorage bolts	Pounds	6,240.0	.05	312.00
Mooring posts	Number	4.0	40.00	160.00
Mooring cleats	do	20.0	25.00	500.00
Total walls				310,830.70
Grand total paid to date				691,253.95

[a] None paid.

Proposals were opened June 27, 1910, for construction and erection of steel lock gates, valves, and operating machinery; six proposals received and consideration thereof in progress at the close of the fiscal year.

Specifications for the excavation of all of the project channel in Niagara River from the ship lock to the natural deep-water harbor, 2½ miles downstream, were ready for printing at the close of the fiscal year, proposals to be opened August 16, 1910.

PROPOSED OPERATIONS AND REMARKS.

Further work under the project is the excavation of the channel from Ferry street to the ship lock, including the removal of the old lock, the completion of lock grounds and buildings, and general repair of Bird Island pier.

The most important of this work is the channel excavation, estimated at $500,000, which can be advanced most advantageously by one large contract for the whole work, with a view to completing the channel and the ship lock ready for use at the same time.

It is therefore recommended that $400,000 be appropriated for the fiscal year ending June 30, 1912, which amount, added to a balance of $100,000 expected to be on hand at the close of the fiscal year 1911, will make up the total of $500,000 estimated to be required.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for works of improvement	[a]$400,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. No. 421, 57th Cong., 2d. sess.)	$52,098.00
March 3, 1905	100,000.00
June 30, 1906	233,000.00
March 2, 1907	1,000,000.00
March 4, 1907	367,000.00
March 4, 1909	1,000,000.00
June 25, 1910	1,000,000.00
Sales and collections	322.25
Total	3,752,420.25

CONTRACTS IN FORCE.

FOR EXCAVATION IN BLACK ROCK HARBOR, NEW YORK, DATED FEBRUARY 1, 1906.

Name of contractor: Empire Engineering Corporation, New York.

Rates:

Removing material overlying bed rock, per cubic yard, place measure	$0.33
Removing bed rock, per cubic yard, place measure	1.85
Removing partition wall, per linear foot	9.00
Handling rock with derrick, per ton	.90

Date of approval: March 6, 1906.
Date of commencement: November 5, 1906.
Date of expiration: December 31, 1908.
Time limit waived.

FOR EXCAVATION IN BLACK ROCK HARBOR, NEW YORK, DATED JULY 12, 1907.

Name of contractor: Buffalo Dredging Company, Buffalo, N. Y.

Rates:

For excavating and removing material overlying bed rock, per cubic yard, place measure	$0.28
Excavating and removing bed rock, per cubic yard, place measure	2.70
Handling and placing excavated rock with derrick, per ton	1.25
Removing partition wall, per linear foot	8.00

Date of approval: July 25, 1907.
Date of commencement: August 28, 1907.
Date of expiration: December 31, 1910.

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[a] Exclusive of the balance unexpended July 1, 1910.

FOR CONSTRUCTING COFFERDAM AND LOCK WALLS IN BLACK ROCK HARBOR, NEW YORK, DATED APRIL 15, 1908.

Name of contractor: MacArthur Brothers Company, New York.

Rates for building cofferdam:

Steel sheet piling, per ton of 2,000 pounds	$53.00
Steel waling and braces, per pound	.05
Clay filling, per cubic yard, place measure	.45
Clay banking, per cubic yard, scow measure	.35
Pumping and maintenance, for all	8,000.00

Rates for building lock walls:

Excavation, per cubic yard, place measure	.19
Handling and placing excavated material, by derrick, per cubic yard, bucket measure	.40
Dredging channel, per cubic yard, scow measure	.16
Concrete, per cubic yard	4.37
Granite for quoins, per cubic yard	60.00
Steel culvert, 72-inch, per linear foot	15.65
Steel culvert inlets, 30-inch, per linear foot	8.65
Steel culvert branches, 18-inch, per linear foot	6.65
Steel pump well pipes, 30-inch, per linear foot	8.65
Steel drain pipe, 18-inch, per linear foot	6.65
Steel I-beams and channels, per pound	.05
Wrought iron or steel lap-welded cable pipes, per pound	.10
Cast-steel bases, per base	100.00
Steel eyebars, per bar	65.70
Anchorage bolts, per pound	.05
Mooring posts, per post	40.00
Mooring cleats, per cleat	25.00

Date of approval: May 25, 1908.
Date of commencement: April 22, 1908.
Date of expiration: June 30, 1912.

COMMERCIAL STATISTICS.

For commercial statistics, see report on Buffalo Harbor and on Tonawanda Harbor and Niagara River, New York.

PP 6.

IMPROVEMENT OF TONAWANDA HARBOR AND NIAGARA RIVER, NEW YORK.

REPORT OF OPERATIONS.

No work was done during the year.

PROPOSED OPERATIONS AND REMARKS.

No work is proposed for the next fiscal year.

The channel of the project is completed, except at the Buffalo waterworks intake crib, where the width of the channel is about 100 feet, and from Tonawanda Iron and Steel Company's docks to the north line of North Tonawanda, where the depth is 12 to 15 feet. Improvement at these localities is not urgent, and sufficient funds are on hand for maintenance. No estimate is therefore made for the fiscal year ending June 30, 1912.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. No. 421, 57th Cong., 2d sess.)	[a] $6,500.00
August 11, 1888	100,000.00
September 19, 1890	75,000.00
July 13, 1892	75,000.00
August 18, 1894	50,000.00
June 3, 1896	50,000.00
March 3, 1899	75,000.00
June 13, 1902	257,700.00
March 2, 1907	3,000.00
Collections	331.42
Total	692,531.42

COMMERCIAL STATISTICS.

[Furnished by the collectors of customs, Buffalo Creek and Niagara districts.]

Arrivals and departures of vessels for the year ending December 31, 1909.

District and vessels.	Arrivals from—				Departures to—			
	Home ports.		Foreign ports.		Home ports.		Foreign ports.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
Buffalo Creek:								
Steam	31	26,989	6	2,118	31	22,049	2	1,239
Sail and barges	32	20,752	5	2,182	40	24,964	4	1,948
Niagara:								
Steam	257	295,023	61	28,127	297	316,361	35	21,899
Sail and barges	182	169,752	70	37,111	209	174,314	35	14,429
Total	502	512,516	142	69,538	577	537,688	76	39,515

Total arrivals and departures:	
Number	1,297
Tonnage	1,159,257
Increase in tonnage, 1909 over 1908 ... tons	416,849
Amount of revenue collected, year 1909, on lake commerce	$145,429.60
Value of imports by lake, year 1909	1,907,081.44
Value of exports by lake, year 1909	None.
Enrolled gross tonnage, Niagara district, 1909	58,135
Greatest draft of vessels ... feet	15

Receipts by lake and river.

[Tons of 2,000 pounds.]

Articles.	1908.	1909.	Articles.	1908.	1909.
Coal		1,290	Railroad ties		14
Iron ore	206,212	433,187	Shingles	1,566	828
Lath	2,334	2,543	Sand	2,100	945
Lumber	452,552	538,896			
Pig iron	7,096	9,462	Total	734,255	990,898
Posts	2,395	8,743			

Shipments by lake and river	None.
Shipments by Erie Canal ... tons	[b] 166,768
Lumber shipments by Erie Canal (included in above) ... feet b. m.	[b] 66,875,194
Receipts by Erie Canal ... tons	[b] 72,317

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[a] $587.52 turned into Treasury June 30, 1890.

[b] Furnished by state superintendent of public works.

Number of vessels passing International Bridge, Niagara River, 1909.

[Furnished by R. J. McMurray, captain of the tug *International.*]

Steamers	4,780
Other vessels	1,208
Total	5,988
Season of navigation, April 1, 1909, to January 8, 1910 ... days	283
Number of times bridge draw was opened during season	3,316
Average number of times bridge was opened per day	11.6

PP 7.

IMPROVING NIAGARA RIVER, N. Y.

[Completing channel across Cayuga Island shoal, H. Doc. 75, 60th Cong., 1st sess.]

REPORT OF OPERATIONS.

No work has been done on the Niagara River from Tonawanda to Niagara Falls since December, 1900, when funds were exhausted.

An appropriation of $10,000 made in the river and harbor act of June 25, 1910, will be used to complete the project as specified therein by widening the cut across Cayuga Island shoal, now 150 to 170 feet wide, to 200 feet.

The funds appropriated by the river and harbor act of June 25, 1910, will complete the project, and as funds for maintenance are not considered necessary, no estimate is made for the fiscal year ending June 30, 1912.

APPROPRIATIONS.

July 13, 1892	$20,000
August 18, 1894	10,000
June 3, 1896	15,000
March 3, 1899	15,000
June 25, 1910	10,000
Total	70,000

COMMERCIAL STATISTICS.

The freight business using the channel consists of raw materials carried on canal boats of 6 to 8 feet draft, towed by tugs from the Erie Canal at Tonawanda to Schlosser's dock. The passenger business consists of excursions from Buffalo on steamers of 6 to 8 feet draft, usually accompanied by a picnic barge of 2 to 4 feet draft towed alongside. During the season of about four months, June to September, from one to five of these vessels daily carry parties down the American channel, around the foot of Grand Island, and return to Buffalo by the Canadian channel; occasionally a party is landed at Schlosser's dock.

The collector of customs reports no arrivals or departures of vessels at Schlosser's dock, Niagara Falls, for the calendar year 1909.

The principal commerce of the port is the receipt of pulp wood for the paper mills of Niagara Falls. This pulp wood comes partly from American ports and partly from Canadian ports on the Great Lakes. It is brought down the Canadian channel on lake vessels to the foot of Grand Island, where it is made into sack rafts and towed across the main channel to Schlosser's dock. Here the rafts are opened, and the sticks floated through a runway down the river past Gill Creek into a boom, from which they are conveyed to the paper mills by an endless-chain carrier.

Arrivals and departures of vessels for the year ending December 31, 1909.

Vessels.	Arrivals from—				Departures to—			
	Home ports.		Foreign ports.		Home ports.		Foreign ports.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
Steamers	24	13,442	33	12,148	21	21,857	35	23,179
Sail and barges	11	6,982	8	6,190	9	4,090	9	4,772
Totals	35	20,424	41	18,338	30	25,947	44	27,951

Total arrivals and departures:	
Number	150
Tonnage	92,660
Increase in tonnage, 1909 over 1908	91,230
Amount of revenue collected for year ending December 31, 1909, tonnage tax	$323.35
Value of imports, water	$3,518.48
Receipts by water, pulp wood ……tons	87,962
Greatest draft of vessels ……feet	13½
New line of transportation established	None.

APPENDIX Q Q.

IMPROVEMENT OF RIVERS AND HARBORS IN THE OSWEGO, NEW YORK, DISTRICT.

REPORT OF CAPT. W. L. GUTHRIE, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1910.

IMPROVEMENTS.

1. Harbor at Charlotte, New York.
2. Harbor at Pultneyville, New York.
3. Harbor at Great Sodus Bay, New York.
4. Harbor at Little Sodus Bay, New York.
5. Harbor at Oswego, New York.
6. Harbor at Cape Vincent, New York.
7. Harbor at Ogdensburg, New York.
8. Removing sunken vessels or craft obstructing or endangering navigation.

United States Engineer Office,
Oswego, N. Y., July 19, 1910.

Sir: I have the honor to forward herewith annual reports [on river and harbor works in this district] for the fiscal year ending June 30, 1910.

Very respectfully,
W. L. Guthrie,
Captain, Corps of Engineers.

The Chief of Engineers, U. S. Army.

Q Q 1.

IMPROVING HARBOR AT CHARLOTTE, NEW YORK.

REPORT OF OPERATIONS.

The only work carried on during the fiscal year was dredging, to restore the channel between the piers from deep water in Lake Ontario to deep water in the Genesee River to the project width and depth. The dredging was done by the U. S. dredge *Frontenac.*

Work was begun October 8, 1909, and continued until December 21, 1909, when the plant was laid up for the season.

Work was resumed March 28, 1910. Up to the close of the fiscal year 54,830 cubic yards, scow measure, of silt, sand, etc., had been removed from the channel, at an average cost of 12.2 cents per cubic yard, the cost including all repairs, supplies, fitting out, laying up, etc., but nothing for depreciation.

Dredging will be continued until the channel is restored to the project width and depth of 16 feet at low water, zero of the Oswego gauge, which is 244.12 above mean tide at New York City.

During the winter the United States dredge was hauled out and repaired.

A survey made in April, 1910, showed that to restore the channel to project width and depth of 16 feet at low water it would be necessary to remove 32,000 cubic yards, scow measure, of silt, sand, etc.

The need of a new dredge for work in the harbors of Lake Ontario is very great, not only because it will reduce the cost of dredging, but also because frequently there is no dredge available for such needed work.

The harbors of Little Sodus, Great Sodus, and Charlotte are subject to continual shoaling, which sometimes occurs suddenly. The project depth of the first two harbors is only 15 feet at low water, while the boats using them draw from 14 to 15 feet, so that there is small increase of depth made below that required for the mere floating of loaded vessels and practically none allowed for such vessels to enter in a seaway.

The depth at Great Sodus and Little Sodus harbors is limited by hardpan, and if it were desired to increase the depth through this hardpan, it would be difficult, if not impossible, to have it done under existing conditions, because there is usually no dredge on Lake Ontario, which has the power necessary to dredge hardpan; and the quantities of material to be removed from these harbors, at any one time, is so small that it would not tempt owners on the Upper Lakes to compete for this work.

This dredging plant would ordinarily be used at Charlotte, Great Sodus, Little Sodus, and Oswego. It will cost approximately $50,000, and the cost should be apportioned, as nearly as possible, to correspond with the probable use of plant at the different harbors.

June 29, 1910, authority was granted by the Chief of Engineers to add to the estimates of funds required for expenditure in fiscal year ending June 30, 1912, $50,000, apportioned as follows:

Charlotte	$25,000
Great Sodus	10,000
Little Sodus	10,000
Oswego	5,000
	50,000

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$50,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. 421, 57th Cong., 2d sess.)	$521,328.40
March 3, 1899	7,000.00
June 6, 1900	3,048.37
June 13, 1902	30,000.00
April 28, 1904	[b]23,000.00
March 3, 1905	80,000.00
March 2, 1907	88,500.00
May 24, 1909 (allotment from appropriation of Mar. 3, 1905)	9,000.00
June 25, 1910	71,680.00
Sales	53.56
	833,610.33

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Of this appropriation $1,269.07 was returned to the Treasury.

CONTRACTS.

No contracts in force.

COMMERCIAL STATISTICS.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	675	1,413	2,088	3,102,238
Sailing	79	116	195	71,024
	754	1,529	2,283	3,173,262

Freight traffic.

Article.	Amount.		Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
	Long tons.	Short tons.			
				Miles.	*Cents.*
Bituminous coal	243,477	272,694	$608,693	152	0.2
Do	246,003	275,523	615,008	60	.6
Do	212,484	237,982	531,210	152	.2
Do	44,095	49,386	110,938	277	.3
Do	22,878	25,623	57,195	86	.465
Do	2,986	3,344	7,465	140	.39
Do	600	672	1,500	96	.365
Do	338	378	845	216	.416
Do	171	192	428	120	.5
Do	400	448	1,000	50	.9
Do	500	560	1,250	94	.426
Do	200	224	500	90	.445
Do	950	1,064	2,375	161	.528
Do	280	314	700	104	.48
Do	2,884	3,230	7,210	457	.25
Coke	754	844	5,037	60	.6
Gypsum rock	214	240	360	60	.6
Plaster	259	290	810	60	.6
Salt	92	103	300	60	.6
Grease	14	16	150	60	.6
Clay	188	210	620	60	.6
Miscellaneous			94,379		
Total		873,337	2,047,973		

Q Q 2.

IMPROVEMENT OF HARBOR AT PULTNEYVILLE, NEW YORK.

REPORT OF OPERATIONS.

No work was done at this harbor during the fiscal year.

The commerce of Pultneyville is insignificant.

For the reason that there is practically no commerce at Pultneyville Harbor nor any prospect of any in the future I am of the opinion that this harbor is not worthy of further improvement, except for the preservation of existing structures.

APPROPRIATIONS.

July 11, 1870	$5,000
March 3, 1871	5,000
June 10, 1872	10,000
March 3, 1873	10,000
June 23, 1874	10,000
March 3, 1875	10,000
August 14, 1876	3,000
June 18, 1878	5,000
March 3, 1879	4,000
June 14, 1880	3,000
March 3, 1881	2,000
August 2, 1882	4,000
September 19, 1890	2,000
July 13, 1892	1,000
August 17, 1894	1,500
June 3, 1896	1,500
March 3, 1899	2,000
March 2, 1907	6,000
	85,000

CONTRACTS.

No contracts in force.

QQ 3.

IMPROVEMENT OF HARBOR AT GREAT SODUS BAY, NEW YORK.

REPORT OF OPERATIONS.

At the beginning of the fiscal year work was in progress upon the project for replacing with concrete the timber superstructure of both piers, the work being done by hired labor and United States plant.

During the season of 1909 there were put in the west pier 6 sections of concrete deck, each 30 feet long and 18 feet wide, and one section covering an old light-house crib, 40 feet long and 40 feet wide.

On the east pier 9 sections, each 30 feet long and 18 feet wide, were put in, making a total for both piers of 490 linear feet of completed work.

The average cost of this work per linear foot was $38.51.

Work was resumed May 17, 1910. To the end of the fiscal year, 60 linear feet of old superstructure were torn out from the east pier, and one concrete deck section, 30 feet long and 18 feet wide, put in. On the west pier, 120 linear feet were torn out and leveling and concrete blocks are set on 60 feet; 35 face-wall and 8 cross-wall blocks, also, were made.

August 10, 1909, the U. S. dredge *Frontenac* and scows were towed to Great Sodus, and work was begun restoring the channel to project depth and width. Work was continued until October 7, when it was suspended, as the plant was urgently needed at Charlotte Harbor. Fourteen thousand eight hundred and fifteen cubic yards, scow measure, of sand, etc., were removed, and a least depth of 14 feet at low water, referred to the zero of Oswego gauge, the elevation of which is 244.12 feet above mean tide at New York City, provided in a channel 80 feet wide. The average cost per yard was 13.74 cents, the cost including repairs, supplies, and all expenses, but nothing for depreciation.

A survey made in April, 1910, showed that the channel had deteriorated, so that there was required the removal of about 34,000 cubic yards of sand, etc., to restore it to project depth and width. It is expected that this work will be done during the working season of 1910.

During the winter the United States derrick scow was hauled out and thoroughly repaired, and minor repairs were made to the two material scows.

The necessity of a new dredging plant for work at this harbor, and others on Lake Ontario, is very great, and reference is here made to the report of operations at Charlotte Harbor, New York, where this matter is fully set forth.

Great Sodus Harbor is worthy of improvement necessary to reconstruct the piers and breakwaters in a durable manner, and to maintain the channel now provided for.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. No. 421, 57th Cong., 2d sess.)	$475,646.80
March 3, 1899	14,000.00
June 13, 1902	5,000.00
June 13, 1902 (allotment)	1,250.00
March 3, 1905 (allotment	1,588.00
March 2, 1907	50,000.00
June 25, 1910	30,000.00
Received from other sources	1.00
	577,485.80

CONTRACTS.

No contracts in force.

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[a] Exclusive of the balance unexpended July 1, 1910.

COMMERCIAL STATISTICS.

Season of navigation, 1909.—Opened April 15, closed December 21.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	25	105	130	18,522
Sailing	36	72	108	20,711
Total	61	177	238	39,233

Freight traffic.

Articles.	Amount.		Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
	Long tons.	Short tons.			
				Miles.	*Cents.*
Bituminous coal	6,154	6,892	$102,877	68	0.[illegible]
Do	1,929	2,160		82	.61
Do	4,013	4,496		112	.49
Do	406	455		69	.65
Do	6,758	7,569		132	.58
Do	2,530	2,834		394	....
Do	351	393		74	.54
Do	93	104		82	.61
Do	3,826	4,285		....	....
Do	231	259		108	.55
Do	270	302		100	.45
Do	1,862	2,085		125	....
Do	222	249		80	.75
Do	1,164	1,304		92	.71
Do	92	103		67	.90
Do	194	217		92	.78
Feldspar	778	871	3,385	68	.6
Total	....	34,577	106,262	....	....

QQ 4.

IMPROVING HARBOR AT LITTLE SODUS BAY, NEW YORK.

REPORT OF OPERATIONS.

At the beginning of the fiscal year work was in progress upon the project for replacing with concrete the timber superstructure of both the east and west piers, and also in restoring the project depth of the channel between the piers, between deep water in Lake Ontario and Little Sodus Bay, all work being done by hired labor and the use of the United States plant.

During the season of 1909, there were put in the west pier 14 deck sections, aggregating 418 linear feet.

In the east pier there were made 12 deck sections, aggregating 362 linear feet, making a total of completed work on both piers of 780 linear feet.

The cost of the work done per linear foot of completed work was $25.58.

June 25, 1910, the plant was towed from Oswego to Little Sodus Bay, and preparations made to resume work of rebuilding the piers.

Dredging in the channel was continued until August 10, 1909, when work was completed.

During the fiscal year 5,780 cubic yards, scow measure, of sand, etc., were removed, making a total of 21,780 cubic yards for the season of 1909. The average cost of dredging was 14.4 cents per cubic yard, the cost including all repairs, supplies, and expenses, but nothing for depreciation.

A survey made in April, 1910, showed that the channel had deteriorated, so that excavation to the amount of about 28,000 cubic yards, scow measure, of sand, etc., will be necessary. This work will be done during the working season of 1910.

The necessity of a new dredging plant for work at this harbor, and others on Lake Ontario, is very great, and reference is here made to the report of operations at Charlotte Harbor, where this matter is fully set forth.

Little Sodus Harbor is worthy of the improvement, necessary to reconstruct piers and breakwaters in a durable manner, and to maintain the channel now provided for.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a]$30,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. No. 421, 57th Cong., 2d sess.)	$338,441.77
June 13, 1902	25,000.00
June 13, 1902 (allotment)	[b]2,000.00
March 3, 1905	30,000.00
March 2, 1907	75,000.00
June 25, 1910	30,000.00
Repayments	21.00
Total	500,462.77

CONTRACTS.

No contracts in force.

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Returned to Treasury, $1,179.04.

COMMERCIAL STATISTICS.

Season of navigation, 1909.—Opened, April 16; closed, December 1.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	56	198	264	57,608
Sailing	52	98	150	46,057
Total	108	296	404	103,665

Freight traffic.

Articles.	Amount.		Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
	Long tons.	Short tons.			
				Miles.	*Cents.*
Coal	27,804	31,140	$431,009.00	237	....
Do	7,407	8,296		110	0.50
Do	8,310	9,307		397	....
Do	2,275	2,548		126	.60
Do	1,042	1,167		117	.495
Do	394	441		....	....
Do	16,003	17,923		139	.25
Do	1,760	2,971		150	.33
Do	3,290	3,685		95	.53
Do	1,902	2,130		120	.50
Do	330	370		157	.59
Do	395	442		190	.53
Do	3,736	4,184		64	.625
Do	481	539		85	.65
Do	804	900		73	.62
Do	1,342	1,403		581	....
Do	463	519		100	.50
Do	250	280		....	....
Do	5,536	6,200		117	....
Do	527	590		58	.86
Do	204	228		73	.68
Do	3,067	3,435		85	.65
Do	828	927		51	.78
Do	124	139		58	.88
Do	612	685		75	.80
Lumber	1,468 M feet b. m.	2,937	41,514.04	....	....
Fence posts	7,060 pcs.	177	380.00	....	....
Miscellaneous	....	4	230.00	....	....
Total	....	104,567	473,133.04	....	....

Q Q 5.

IMPROVEMENT OF HARBOR AT OSWEGO, NEW YORK.

REPORT OF OPERATIONS.

At the beginning of the fiscal year riprap stone was being received and placed on the lake face of the outer breakwater under the contract with the Adams & Duford Company, of Chaumont, N. Y. This work was carried on until November 11, 1909, when this contract was completed. During the fiscal year 34,281.11 net tons of riprap stone were received, making a total of 46,593.46 net tons received under this contract.

September 15, 1909, an emergency contract was entered into with John J. Sullivan, of Gouverneur, N. Y., for furnishing on cars at Oswego, N. Y., 15,000 net tons of riprap stone. Up to December 9, 1909, when work was suspended for the winter, 2,590.52 net tons had been delivered and accepted.

Work was resumed April 16, 1910, under this contract, and continued to June 21, 1910, when this contract was annulled for nonfulfillment. A total of 4,190.79 net tons was received, leaving 10,809.21 tons to be obtained in order to complete the total amount called for.

The replacing of old timber superstructure on wharves near storehouse with concrete was begun. One hundred linear feet were rebuilt, 86 cubic yards of concrete being placed.

The U. S. tug *Brewerton*, formerly the *Arthur Jones*, was hauled out and rebuilt. Her boiler and machinery were also thoroughly repaired. A material scow was also hauled out and repaired.

The two scows which were under construction at the beginning of the fiscal year were completed.

The necessity of a new dredging plant for work at this harbor, and others on Lake Ontario, is very great, and reference is here made to the report of operations at Charlotte Harbor, New York, where this matter is fully set forth.

Estimate of additional funds required.

Amount required for expenditure in fiscal year ending June 30, 1912, for maintenance of improvement	[a] $85,000

Submitted in compliance with requirements of sundry civil act of June 4, 1897, and of section 7 of the river and harbor act of 1899.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. 421, 57th Cong., 2d sess.)	[b] $1,842,612.87
June 3, 1896	60,000.00
March 3, 1899	60,000.00
March 22, 1901 (allotment)	10,000.00
June 13, 1902	51,000.00
March 3, 1905	100,000.00
March 2, 1907	100,000.00
March 4, 1909	100,000.00
March 3, 1909 (allotted Apr. 9, 1909)	40,000.00
June 25, 1910	125,000.00
Sales	3,306.44
	2,491,919.31

CONTRACTS.

No contracts in force.

COMMERCIAL STATISTICS.

Season of navigation, 1909.—Opened April 15, closed December 21.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	698	541	1,239	451,197
Sailing	277	612	889	280,318
Total	975	1,153	2,128	731,515

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[a] Exclusive of the balance unexpended July 1, 1910.

[b] Thirty-six thousand dollars allotted and transferred not shown in House Document 421, Fifty-seventh Congress, second session.

Freight traffic.

Articles.	Amount.		Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
	Long tons.	Short tons.		*Miles.*	*Cents.*
Coal	202,910	227,250	$2,688,324	227	0.35
Do	2,276	2,549		125	.36
Do	1,420	1,590		137	.33
Do	368	412		....	....
Do	1,053	1,179		120	.375
Do	326	365		141	.57
Do	163	183		50	.9
Do	1,707	1,912		120	.66
Do	8,149	9,127		70	.7
Do	3,324	3,723		87	.7
Do	2,045	2,290		1,022	.064
Do	438	491		195	.5
Do	559	626		182	.5
Do	457	512		165	.3
Do	130	146		....	....
Do	13,700	15,344		100	.55
Do	35,471	39,728		56	.71
Do	6,252	7,002		160	.4
Do	182	204		56	.30
Do	1,054	1,180		110	.5
Do	824	923		50	.9
Do	131	147		....	....
Do	62,079	69,528		144	.28
Do	1,340	1,501		105	.38
Do	1,310	1,468		150	.595
Do	5,645	6,320		112	....
Do	1,480	1,657		190	.475
Do	442	495		....	....
Do	884	990		102	.31
Do	233	261		75	.735
Do	2,363	2,645		102	.54
Do	6,817	7,635		60	.75
Do	10,741	12,030		95	.527
Do	178	199		....	....
Do	631	707		140	.357
Do	204	228		56	.8
Do	2,249	2,520		116	.65
Do	3,142	3,520		110	.53
Do	2,034	2,278		80	.58
Do	1,809	2,025		122	.66
Do	353	395		53	.71
Do	4,848	5,430		1,022	.054
Do	559	626		56	.8
Do	56	63		....	....
Do	2,951	3,305		776	.07
Do	3,969	4,445		75	.73
Do	31,917	35,747		954	.073
Do	227	254		45	1.11
Do	161	180		80	.81
Do	3,198	3,582		62	.81
Do	78,662	88,101		1,030	.067
Do	705	790		50	1.0
Do	135	151		....	....
Do	7,587	8,497		110	.455
Do	698	782		30	1.33
Do	1,049	1,172		122	.656
Do	2,099	2,350		1,093	....
Lumber	[a]20,192,000	35,426	397,828	280	.3
Shingles	[b]5,063,000	844	9,997	160	.5
Lath	[b]1,120,000	395	2,992	230	.6
Pulp wood	[c]19,115	38,230	119,200	519	.23
Grain	[d]226,000	5,724	133,900	1,149	.14
Miscellaneous	....	89	366	....	....
Total	....	669,387	3,351,792	....	....

[a] Feet. [b] Pieces. [c] Cords. [d] Bushels.

Q Q 6.

IMPROVEMENT OF HARBOR AT CAPE VINCENT, NEW YORK.

REPORT OF OPERATIONS.

No work was done during the fiscal year, no funds being available for construction.

A watchman was on duty during the year to regulate the mooring of vessels to the breakwater.

PROPOSED OPERATIONS AND REMARKS.

This breakwater is not designed to protect an anchorage, but for vessels to moor to and to protect vessels moored at the wharves at Cape Vincent. The projected length is 1,550 feet, and 910 feet have been completed, of which 50 feet is shore return.

It is not considered necessary to extend the shore return, but the remaining 540 feet of main breakwater, to complete it to the project length of 1,400 feet, should be built. With funds provided in the act of June 25, 1910, 220 linear feet of this will be built, leaving 320 feet to be provided for.

APPROPRIATIONS.

June 3, 1896	$25,000
March 3, 1899	25,000
June 13, 1902	48,000
March 3, 1905	30,000
June 25, 1910	36,000
	164,000

CONTRACTS.

No contracts in force.

COMMERCIAL STATISTICS.

Season of navigation, 1909.—Opened April 7; closed December 31.

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	102	441	543	79,367	11,200
Sailing	48	62	110	23,273	....
Total	150	503	653	102,640	11,200

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Cents.*
Furs			$3,198	22	10
Household goods			11,900		
Pulp wood	19,236 cords	38,472	192,360	490	.245
Cattle	783 head		11,475	20	.5
Horses	4 head		500	22	4.5
Posts	16,910 pieces	423	845	22	7.3
Mica	53,444 pounds	27	11,940	22	10
Lumber	1,053,000	1,847	22,543	22	2.6
Shingles	3,036,000	506	7,506	22	2.7
Timber	1,743 cubic feet	40	430	22	2.6
Fish	1,362,519 pounds	681	72,395	22	10
Pease	2,658 bushels	81	2,658	22	5
Cotton wearing apparel			14,412	22	10
Oysters	11,760 gallons		9,408	22	
Fruit			2,936	22	
Hardware			7,589	22	
Machinery			11,156	22	
Jewelry			21,679	22	
Boots and shoes	1,588 pairs		3,970	22	
Musical instruments			1,872	22	
Paper hangings			3,962	22	
Silk goods			1,483	22	
Furniture			3,839	22	
Books			11,930	22	
Chemicals			5,060	22	
Art goods			864	22	
Plated ware			4,323		
Total		42,077	442,233		

QQ 7.

IMPROVEMENT OF OGDENSBURG HARBOR, NEW YORK.

REPORT OF OPERATIONS.

At the beginning of the fiscal year dredging was in progress under the contract with the Central Dredging Company, dated July 12, 1907. Up to this time 302,357 cubic yards, scow measure, had been removed.

Dredging was continued up to the close of the fiscal year. It is expected that the contract will be completed by August 14, 1910. During the fiscal year 38,643 cubic yards sand, mud, etc., were removed, making a total of 341,000 cubic yards removed under this contract.

Ogdensburg Harbor is worthy of improvement to the extent necessary to maintain existing channels and to deepen them where necessary.

APPROPRIATIONS.

For previous projects (as listed in H. Doc. 421, 57th Cong., 2d sess.)	$282,000.00
March 3, 1899	15,000.00
June 13, 1902	20,000.00
March 13, 1905	15,000.00
March 3, 1905 (allotment)	9,938.29
March 2, 1907	75,000.00
June 25, 1910	100,000.00
	516,938.29

CONTRACTS.

No contracts in force.

COMMERCIAL STATISTICS.

Season of navigation, 1909.—Opened April 10; closed December 22 (for all vessels exclusive of car ferry; car ferry operates entire year).

Vessel classification.

Class.	American.	Foreign.	Total.	Net registered tonnage.
Registered:				
Steamers	1,728	441	2,169	907,465
Sailing	224	56	280	124,499
Total	1,952	497	2,449	1,031,964

The above statement does not include traffic by ferryboats, and refers only to documented vessels.

Freight traffic.

Articles.	Amount, in customary units.	Amount, in short tons.	Average haul or distance freight was carried.	Rate per ton-mile.
By vessels other than car ferry:[a]			*Miles.*	*Cents.*
Coal	221,916 long tons	248,546	131	0.3
Lumber	20,000,000 feet	35,087	825	.34
Flour and feed	45,321 long tons	50,759	1,047	
Grain	4,053,013 bushels	112,583	1,127	.095
Miscellaneous	178,250 long tons	199,640		
Total		646,615		
By car ferry:[b]				
Raw silk	1,712 long tons	1,917	7/8	17
Nickel matte	17,496 long tons	19,595	7/8	17
Copper bars	2,800 long tons	3,136	7/8	17
Wood pulp	7,935 long tons	8,887	7/8	17
Lumber	99,702,000 feet	139,828	7/8	17
Shingles	23,689,000	3,948	7/8	17
Lath	30,312,850 pieces	7,578	7/8	17
Coal and coke	155,947 long tons	174,660	7/8	17
Machinery	18,800 long tons	21,056	7/8	17
Chemicals	621 long tons	695	7/8	17
Miscellaneous	19,706 long tons	22,070	7/8	17
Total		403,370		

[a] Number of passengers carried, 25,000 (estimated).
[b] Number of passengers carried, 75,000 (estimated).

Statement of the estimated proportion of the water-borne commerce (receipts and shipments) that is carried on the car ferry, port of Ogdensburg, N. Y.

Value of imports by ferry	$25, 828, 804
Value of imports by other vessels	500, 000
Value of exports by ferry	3, 097, 949
Value of exports by other vessels	65, 000

THE PRINCIPAL ITEMS OF RECEIPTS BY FERRY.

Raw silk	long tons	1, 712
Nickel matte	do	17, 496
Copper bars	do	2, 800
Wood pulp	do	7, 935
Lumber	feet	99, 702, 000
Shingles	pieces	23, 689, 000
Lath	do	30, 312, 850

THE PRINCIPAL ITEMS OF RECEIPTS BY OTHER VESSELS.

Coal	short tons	248, 546
Lumber	feet	20, 000, 000
Flour and feed	long tons	45, 321
Grain	bushels	4, 053, 013
Miscellaneous merchandise	long tons	78, 250

THE PRINCIPAL ITEMS OF SHIPMENTS BY FERRY.

Coal and coke	long tons	155, 947
Machinery	do	18, 800
Chemicals	do	621
Miscellaneous merchandise	do	19, 706

SHIPMENTS BY OTHER VESSELS.

Miscellaneous merchandise	long tons	100, 000

Q Q 8.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

REPORT OF OPERATIONS.

Wreck of steamer *Islander:* This was a passenger vessel belonging to the Thousand Island Steamboat Company. She was burned and sunk at a dock in St. Lawrence River at Alexandria Bay, N. Y., where she became a menace to navigation.

The United States scow from Oswego, in tow of the United States tug, went to Alexandria Bay and began the work of removal. Work was begun October 11 and was continued until October 27, 1909, when work was suspended and the plant returned to Oswego, where it was greatly needed for work at that harbor.

The boiler and parts of her machinery were saved.

The wreck was finally removed December 3, 1909, by the steamer *Hinckley*, which was hired for that work.

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